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# STATISTICS

# OF

# CHOLERA

BY

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# PREFACE TO THE SECOND EDITION.

THE first edition of the "Statistics of Cholera" was printed in the year 1849. It was founded on The Return to Parliament of the 17th February 1847, which Mr. Hume, on the 16th June 1845, had moved for at my request; and, while preparing my observations on it, Assistant Surgeon Lorimer's able Report on Cholera appeared: I have here pleasure in mentioning Dr. Lorimer's name; for, as I believed then, I believe now, that the numerical mode of investigating this ailment is likely to lead to results of value, and Dr. Lorimer's investigations took precedence of mine.

In the first edition, I expressed a hope that the data furnished might prove useful to some of the numerous inquirers then in the field, by suggesting to them new modes of inquiry; and, in 1856, I followed up the investigation by printing a large edition of "The Localities in India, Exempt from Cholera." Since then the work devolving on me and my distance from available sources of information have debarred me from doing more than watch the progress of the inquiries as to Cholera and collect such items of information as seemed of use: but the recent writings of Inspector General Murray, Drs. Duncan, John and Hugh Macpherson, the Reports of The Royal Sanitary Commission, and the Members of the Sanitary Commission with the Government of India—Mr. Strachey, Captain Malleson, Drs. Cunningham and Bryden—have added so vast a store of fresh facts that I now re-print the "Statistics of Cholera" in order to bring information as to this ailment up to the present day and I believe that a little further effort now will obtain for the world very valuable results.

SECUNDERABAD,
15*th February* 1870.

# PREFACE TO THE FIRST EDITION.

THE data accumulated during the thirty years that have elapsed since epidemic cholera first made its appearance seeming to me sufficiently abundant to repay an inquiry into the mode in which this disease developes itself, and the interval of time being sufficiently long to allow of fair averages being struck, I have entered upon the investigation of the subject; and, though some of the results obtained may surprise others as much as they did myself, I trust that a perusal of the tables will show that every care has been taken to ensure their accuracy, and that the deductions are fully warranted by the facts adduced.

This brochure, framed with the object of collecting all that is known concerning cholera, is offered as a contribution to vital statistics; and the investigation being as yet very imperfect, particularly as regards the origin and treatment of the disease, I hope that the data here furnished may prove useful to some of the numerous inquirers now in the field, by suggesting new subjects of inquiry, and new modes of conducting it, and thus lead, perhaps, to the explanation of many hitherto unaccountable peculiarities of the malady. I have also great hopes that the inquiry (alluded to in the Appendix) now in progress in the Madras Presidency, may prove of great value in this respect, and trust ere long to be able to communicate the results of it.

It will be seen, on perusal of the following pages, that medicinal treatment is proved to be of decided value in this disease, but I have but slightly dwelt on that point, my own views leading me rather to inquire into the means of preventing sickness, than those of curing it. I allow it to be a beautiful idea that the Supreme Being, in permitting his creatures to be afflicted with pestilences, has also in his, mercy provided remedies for their cure, and those who entirely adopt this belief will doubtless continue to search exclusively for means of removing this and other maladies ; but, without in any way wishing to damp the energy of such inquirers, I think all Medical men will allow the superiority of prophylactic over mere curative measures, and admit that those who regard disease as the consequence of an infraction of the physical laws decreed for our guidance, and consider it as a warning to observe these laws more strictly for the future, take a no less elevated view of their duties ; for we thereby open to ourselves a vast field for the exercise of benevolence in discovering the source of disease and the means of preventing it ; whilst, if we take the former view, we may look on with apathy till sickness break forth, and though we may then exert all our energies and employ all the means furnished by art and science to subdue it, the following pages will too clearly show, that, in combatting with Cholera, at least, we shall meet with but little success :—

I have given below* a list of the sources from which the information contained in the following pages is derived ; I have great pleasure in stating that all my brother officers, in the Madras Presidency, have evinced the greatest willingness to assist me, by furnishing me with extracts from the records of their departments, and I beg to offer to the Members of the Medical Board, Surgeon George Pearse, and Assistant Surgeon Lorimer, my best thanks for their kindness.

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* Statistical Reports on the Sickness, Mortality and Invaliding of H. M. Troops Vols. 1838, 1839, 1840 and 1841.
Statistical Reports on the Health of the Navy, Vols. 1840 and 1841.
Reports on the Medical Topography of the Madras Army, Vols. 1842, 1843, 1844, and 1844.
Johnson and Martin on Tropical Climates, Edition 1841.
Dr. Lorimer's Report on Cholera, 1846.
Records of the Madras Medical Board's Office.
Records of the Office of the Superintending Surgeon Ceded Districts.
Surgeon James Macgregor H. M. K. O. Borderers, in Madras Medical Journal.
Parliamentary Return, 17th February 1847.
Dr. Forrie's Report on the United States Army.

I regret that I have been unable to add to the tables herein given, any particulars concerning the Bengal and Bombay Armies, having, as yet, received no answer from the authorities, there, to my applications for information.

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# STATISTICS OF CHOLERA.

It is not known when cholera first occurred amongst the people of India, yet this point in the history of the disease is of value in any discussion of the question whether, like many of the plagues which have invaded Europe, and disappeared, this ailment will also run its course and then cease.

Dr. John Macpherson in his pamphlet on "Cholera in the East" gives a resumé of all that is known regarding the appearance of this disease, and he arrives at the conclusion that cholera of various degrees of intensity, with the symptoms of the several forms of the disease running into each other as now, has always prevailed in India as it does at the present day. He shows that it has been known to Europeans from their first arrival in the country, and instances a notice of its occurrence at Calicut, in 1503, though the Portuguese only reached Goa in 1497. He is further of opinion that in the West and South of India, it has always been endemic : but, from the fact that it is not alluded to by several European writers who have resided in India, and who were not likely to have been silent regarding its ravages had it been epidemic during their stay, he concludes that it has had periods of activity and quiescence. One of these invasions occurred between the years 1756 and 1797 ; but, between 1775 and 1785, and particularly in the years 1781, 1782 and 1783, the disease prevailed severely in an epidemic form. From that time there was a season of comparative slumber till 1817, when the disease again awoke to a period of activity, which has continued to the present day. (See Appendix A).

The Proceedings of the Madras Hospital Board of the 29th November 1787, notice "A disease having, in October last, prevailed at "Arcot, similar to an endemic that raged amongst the natives about "Paliconda, in the Ambor Valley in $\frac{1769}{1770}$ ; in an Army of observation in "January 1783, and the Bengal detachment at Ganjam in 1781, and "several other places at different times, as well as epidemic over the "whole coast in 1783, under the appearance of dysentery, Cholera-mor-"bus or Mordexym, but attended with spasms at the precordia and sudden "prostration of strength, as characteristic marks," and the Board then ordered to be recorded letters from Mr. Thompson, Surgeon of the 4th Regiment, from Mr Duffin, Head Surgeon at Vellore, and from Mr. Davis, Member of the Hospital Board. Mr. Duffin in his letter dated Vellore 28th October 1787, mentions that its progress was so rapid, many of the men were carried off in twelve hours. He speaks doubtfully as to the value of opiates, and recommended castor oil as the only effectual remedy, with wine, brandy and water and opium and "scarce ever lost a man." In a subsequent letter of 3rd November 1787, he attributes the out-break at Arcot to filth, and the peculiar weather, and recommends removal; notices the pallid hue of the body, spasms in the extremity, thirst, incessant vomiting, profuse clammy cold sweats, griping, purging and bilious coluves, resembling yeast, and the urine pale and in small quantity and he recommends wine, frictions, hot baths, hot fomentations, warm water steaming, and clysters.

Surgeon Maxwell Thompson of the 4th Regiment of Infantry in a letter dated Arcot 5th November 1787 reports that the disease then raging was "exactly the same as prevailed at Trincomallee in the months of April "and May 1782, when the season was very hot and chill."

Mr. Thomas Davis, Head Surgeon and Member of the Hospital Board, which then consisted of Dr. James Anderson, Mr. Lucas, and Mr. Davis, in a letter dated Madras 29th November 1787 reports his visit to Arcot on 29th October 1787, and his having found in the epidemic hospital three different diseases, vizt. "patients labouring under the cholera-morbus; an "inflammatory fever with universal cramps; and a spasmodic affection of "the nervous system distinct from cholera-morbus" and "understood "from the Regimental Surgeon that the last disease had proved fatal to "all who had been attacked with it and that he had already lost seven and "twenty men of the Regiment in a few days. Five patients, he adds were "then shewn me with scarce any circulation whatever to be discovered; "their eyes much sunk within their orbits, their jaws apparently set, their "bodies universally cold, except at the precordia, and their extremities "livid." He "could discover no bilious indications in the whole system." He notices as a symptom the uncontrollable thirst, and after death the contracted bladder, and, in the ailment last described, we recognise the cholera-morbus of the present day.

It has distinct names in the various tongues of the South of Asia (see Appendix B), several of them, as the Arabic, Bengali, Hindi, Tamul, and Telugoo, describing the more prominent symptoms, of purging, or vomiting and purging; others of them, as the Arabic marz ul-aswad and Hindi-kala-marri or black-death, descriptive of the severity of the ailment, and the mordexym of the authors of the last century sounds like mort-de-chien or dog's death of the French. And, it is indeed an ailment from which, when in its severer forms, many of the races of India flee, leaving the dead unburied and the sick to die, which they regard as emanating from a goddess whom they worship ; which carries off the strong robust man in a few hours, and passes by neither race nor age. Writing of the severer form known as the kala-marri, Dr. F. N. Macnamara tells us that in 1864 and 1865, " he had upwards of 1500 cases of cholera in the Assam and Cachar coolee depôts, and it was then a most common thing for these unfortunate people to die two or three at a time, as if they had been killed by some poison, paralysing suddenly all the vital energies. The Native Doctors," he adds, " used to report to me thus,—one man of the gang had Cholera and died, and the rest fell about like dead men, and they also died." The men died in one hour or so without vomiting or purging, as if in a deadly faint. Others might vomit once or twice, or might be purged once or twice with the characteristic discharges." Of those attacked with this ailment, whether Europeans or Natives of India, even with all the care that the medical art can give only one in every two or three of the sick recover, the loss to the community is every year great, and in some years it is enormous, a large proportion of all the deaths in India being caused by this one disease.

Cholera is separately enumerated in the Parliamentary Returns which were obtained in 1846, from the three Presidencies of India. Since the early part of 1817, when this disease made its re-appearance, in the continuous form that it now assumes, it has visited nearly all the countries north of the equator ; in most of those countries, however, although its ravages extended over all the population, it only remained a year or two and then disappeared for a considerable period of years : but, in India, it has continued to recur, sometimes generally, and occasionally to a limited extent, but still to recur year after year in one part or another of the country, and in the period embraced in the parliamentary returns of 1846, it caused nearly the eighth part of all the mortality of the European soldiers in India, while, of the deaths amongst native troops, nearly a fifth part arose from this singular disease. Out of 13,012 deaths of the H. E. I. Company's European soldiers in India, in the 20 years from 1825 to 1844, the deaths from cholera amounted to 1,741 ; and amongst their native armies, of 69,973 deaths, this disease alone occasioned a loss of 13,260, nearly a fifth part of the whole mortality.

In some seasons this disease has appeared only in sporadic cases ; in other years it has broken out in an epidemic form, but it has visited each Presidency every year, and while, in some stations, it has scarcely ever been absent from the crowded bazaars, in other places its occurence has been almost unknown.

TABLE I.—Showing the total deaths of the European and Native Soldiers, of the Indian Armies, and the Ratio per 1000 of their strength that died from Cholera in each of the three Presidencies, in tho years from 1825 to 1844.

| Years. | EUROPEAN SOLDIERS. | | | | | | Years. | NATIVE SOLDIERS. | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | BENGAL. | | MADRAS. | | BOMBAY. | | | BENGAL. | | MADRAS. | | BOMBAY. | |
| | Total Deaths by Cholera. | Annual Ratio per 1000 died. | Total Deaths by Cholera. | Annual Ratio per 1000died. | Total Deaths by Cholera. | A nnual Ratio per 1000 died. | | Total Deaths by Cholera. | Annual Ratio per 1000 died. | Total Deaths by Cholera. | Annual Ratio per 1000 died. | Total Deaths by Cholera. | Ann ual Ratio per 1000 died. |
| 1825 | 25 | 5·5 | 60 | 13·7 | 1 | 0·5 | 1825 | 216 | 1·4 | 792 | 12·7 | 237 | 5·8 |
| 1826 | 23 | 5·2 | 11 | 2·4 | 20 | 11·5 | 1826 | 189 | 1·2 | 294 | 4·0 | 183 | 4·6 |
| 1827 | 34 | 8·9 | 6 | 1·2 | 5 | 2·6 | 1827 | 137 | 1·0 | 283 | 4·0 | 33 | 0·8 |
| 1828 | 26 | 6·2 | 13 | 2·4 | 13 | 5·8 | 1828 | 199 | 1·6 | 368 | 5·7 | 85 | 2·5 |
| 1829 | 29 | 6·4 | 3 | 0·5 | 1 | 0·4 | 1829 | 156 | 1·4 | 213 | 3·5 | 21 | 0·6 |
| 1830 | 42 | 9·2 | 32 | 6·0 | 2 | 0·7 | 1830 | 236 | 2·5 | 126 | 2·2 | 112 | 3·6 |
| 1831 | 38 | 7·8 | 41 | 7·6 | 4 | 1·7 | 1831 | 181 | 2·1 | 271 | 5·3 | 46 | 1·4 |
| 1832 | 47 | 10·8 | 39 | 7·7 | 13 | 5·3 | 1832 | 232 | 2·9 | 333 | 5·6 | 63 | 2·1 |
| 1833 | 51 | 12·0 | 48 | 10·1 | 8 | 3·5 | 1833 | 259 | 3·2 | 579 | 11·6 | 116 | 4·4 |
| 1834 | 63 | 16·5 | 2 | 0·4 | 2 | 0·9 | 1834 | 242 | 3·0 | 58 | 1·1 | 96 | 3·5 |
| 1835 | 48 | 11·7 | 1 | 0·2 | 0 | 0 | 1835 | 217 | 2·7 | 2 | 0·04 | 28 | 0·9 |
| 1836 | 43 | 10·1 | 1 | 0·2 | 1 | 0·5 | 1836 | 223 | 2·7 | 27 | 0·5 | 2 | 0·0 |
| 1837 | 39 | 9·0 | 19 | 4·0 | 12 | 6·4 | 1837 | 189 | 2·3 | 351 | 7·2 | 113 | 4·0 |
| 1838 | 75 | 17·4 | 7 | 1·4 | 7 | 3·0 | 1838 | 187 | 2·2 | 502 | 10·2 | 12 | 0·4 |
| 1839 | 65 | 15·8 | 27 | 5·7 | 31 | 15·1 | 1839 | 249 | 2·6 | 249 | 4·8 | 148 | 5·1 |
| 1840 | 51 | 10·7 | 26 | 5·1 | 24 | 10·1 | 1840 | 136 | 1·3 | 122 | 2·0 | 131 | 4·8 |
| 1841 | 81 | 17·0 | 5 | 0·8 | 4 | 1·1 | 1841 | 291 | 2·7 | 241 | 3·7 | 24 | 0·7 |
| 1842 | 47 | 9·8 | 41 | 6·7 | 90 | 19·1 | 1842 | 259 | 2·2 | 741 | 11·6 | 158 | 5·9 |
| 1843 | 107 | 21·3 | 13 | 2·1 | 2 | 0·3 | 1843 | 361 | 3·1 | 905 | 13·8 | 109 | 3·4 |
| 1844 | 87 | 17·2 | 37 | 6·2 | 48 | 13·0 | 1814 | 329 | 2·7 | 519 | 8·0 | 79 | 1·5 |
| Total 20 yrs | 1021 | 11·554 | 432 | 4·268 | 288 | 5·648 | Total 20 years. | 4488 | 2·19 | 6976 | 6·03 | 1796 | 2·81 |

The Returns for this disease, from the Year 1845 inclusive, are less complete, but the following information is available :

| EUROPEANS. | | | | | | NATIVES. | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| BENGAL. | | | MADRAS. | | | BENGAL. | | | MADRAS. | | |
| Years. | Total deaths by Cholera. | Annual Ratio per 1,000 died. | Years. | Total deaths by Cholera. | Annual Ratio per 1,000 died. | Years. | Total deaths by Cholera. | Annual Ratio per1000 died. | Years. | Total deaths by Cholera. | Annual Ratio per 1000 died. |
| 1843 to 46-7 | 1177 | 13·5 | 1845 | 124 | 9·8 | 1845 | | | 1845 | 708 | 9·4 |
| 1847-48 | 89 | 4·8 | 1846 | 75 | 6·7 | 1846 | | | 1846 | 1208 | 16·1 |
| 1848-49 | 110 | 6·7 | 1847 | 22 | 1·9 | 1847 | | | 1847 | 78 | 1·1 |
| 1849-50 | 234 | 12·6 | 1848 | 2 | 0·2 | 1848 | | | 1848 | 93 | 1·6 |
| 1850-51 | 8 | 0·3 | 1849 | 26 | 2·7 | 1849 | | | 1849 | 104 | 2·07 |
| | | | 1850 | 21 | 2·2 | 1850-1 | | | 1850-1 | 183 | 3·6 |
| 1851-52 | 61 | 2·9 | 1851-2 | 15 | 1·6 | 1851-2 | | | 1851-2 | 202 | 4·04 |
| 1852-53 | 260 | 12·4 | 1852-3 | 155 | 16·9 | 1852-3 | | | 1852-3 | 125 | 2·5 |
| 1853-54 | 258 | 11·9 | 1853-4 | 61 | 7·3 | 1853-4 | | | 1853-4 | 284 | 5·9 |
| 1854-55 | 47 | 2·35 | 1854-5 | 65 | 7·2 | 1854-5 | | | 1854.5 | 190 | 4·04 |
| 1855-56 | 55 | 2·77 | 1855-6 | 11 | 1·4 | 1855-6 | | | 1855-6 | 59 | 1·2 |
| 1856-57 | 704 | 33·05 | 1856-7 | 58 | 7·7 | 1856-7 | | | 1856-7 | 141 | 2·0 |
| 1858 | 401 | 9·16 | 1857-8 | 112 | 11·9 | 1857-8 | | | 1857-8 | 177 | 3·6 |
| 1859 | 478 | 8·67 | 1858-9 | 47 | 3·0 | 1858-9 | | | 1858-9 | 227 | 3·9 |
| | | | 1859-60 | 99 | 5·8 | 1859-60 | | | 1859-60 | 260 | 4·2 |
| 1860 | 589 | 12·04 | 1860 | 42 | 3·2 | 1860 | | | 1860 | 150 | 3·4 |
| 1861 | 1065 | 23·72 | 1861 | 37 | 2·6 | 1861 | 163 | 4·09 | 1861 | 64 | 1·6 |
| 1862 | 413 | 9·61 | 1862 | 41 | 3·1 | 1862 | 90 | 2·51 | 1862 | 84 | 2·6 |
| 1863 | 169 | 4·09 | 1863 | 39 | 3·1 | 1863 | 57 | 1·52 | 1863 | 84 | 2·7 |
| 1864 | 103 | 2·55 | 1864 | 33 | 2·5 | 1864 | 62 | 1·67 | 1864 | 112 | 3·9 |
| 1865 | 116 | 3·12 | 1865 | 38 | 2·9 | 1865 | 91 | 2·83 | 1865 | 133 | 5·4 |
| 1866 | 48 | 1·37 | 1866 | 28 | 2·5 | 1866 | 95 | 2·54 | 1866 | 95 | 3·4 |
| 1867 | 479 | 13·84 | 1867 | 4 | 0·3 | 1867 | 124 | 3·17 | 1867 | 22 | 0·7 |
| 1868 | ... | ... | 1868 | 5 | 0·5 | ... | ... | ... | 1868 | 18 | 0·6 |

The above tabular statements show how continuous this disease has been, diminishing in Madras in some years and increasing in others without any apparent sequence. But, in the European forces of Bengal, in the years 1843 to 1846-7, the rate of Cholera deaths per 1,000 of the strength was 13·5. The next two years the rate was 4·8 and 6·7, and then, in 1849-50, it rose to 12·6per 1,000. Two years of great quiescence were followed in 1852-3 and 1853-4 by the high rates of 12·4 and 11·9. Then again there followed two years of great quiet, succeeded by six years of activity, during which the rates were 33·05; 9·16; 8·67; 12·04; 23·73, and 9·61, and finally four quiet years were followed in 1867 by a rate of 13·84 per 1,000. The Bengal European Army is suffering much more from Cholera than that of Madras. In the 26 years 1843 to 1867, there died from this disease in Bengal 6,864 European Soldiers, and in Madras in the 24 years 1845 to 1868, the deaths were 1,165 in number. A European Regiment's strength has fallen in Bengal once in every three or four years. There died 682 of the Native soldiers of Bengal in the seven years 1861 to 1867; and in the 24 years 1845 to 1868, of the Madras Native soldiers, there died 4,801 from this disease, numbers equal to the strength of a Native Regiment of Infantry once in every seven and every three and a half years. With such a loss of life from this single ailment, to aid in its prevention is a public duty.

European Soldiers are more frequently attacked with Cholera than Native Soldiers.

From these tables it would also appear that cholera has carried off a greater proportion of the strength of the European soldiers than of the native army, and it is a curious matter to observe that while from 1825 to 1844 the Europeans in the Bengal army have suffered from it most of all the Presidencies, the natives of that army suffered the least, a circumstance which will be observed by placing the totals of the columns together:

| TABLE II. | EUROPEAN SOLDIERS. | | NATIVE SOLDIERS. | |
|---|---|---|---|---|
| Presidencies. | Total Deaths from Cholera in 20 years. | Average Annual Ratio per 1,000 of mean strength died in the 20 years. | Total Deaths from Cholera in 20 years. | Average Annual Ratio per 1,000 of mean strength died in the 20 years |
| Bengal........ | 1,021 | 11·554 | 4,488 | 2·19 |
| Madras........ | 432 | 4·268 | 6,976 | 6·03 |
| Bombay........ | 288 | 5·648 | 1,796 | 2·81 |

The Returns, however, afford no means of ascertaining the cause of the difference in the rate of mortality from cholera, with the European and native soldiers, and as the cantonments in which the bulk of the two classes of troops are distributed are often, even when in the same command, many hundred miles apart, doubts might arise as to whether the greater number of deaths among the Europeans had been caused by their being located in stations where Cholera was more frequent, or whether it had occurred from their being more susceptible to the disease,—but the following table, which has been obtained from the Reports on the Madras Army and from Dr. Macgregor's papers in the Madras Journal, will throw some light on this point.

TABLE III, Showing the Average annual ratio per 1,000 of mean strength, of the European and Native soldiers in the same cantonments admitted for cholera :

| | Aggregate Strength. | TOTAL. | | Average Annual Ratio per 1,000 of mean strength admitted by Cholera. |
|---|---|---|---|---|
| | | Admissions from Cholera. | Deaths by Cholera. | |
| Kamptee, Europeans of all Arms, 10 years from 1829 to 1838... | 9,574 | 153 | 39 | 15·98 |
| Kamptee, Natives of all Arms, 10 years from 1829 to 1838... | 49,313 | 148 | 87 | 3·00 |
| St. Thomas' Mount, European Horse Artillery, 9 years, from 1829 to 1838 exclusive of 1831....... | 1,721 | 23 | 5 | 13·36 |
| St. Thomas' Mount, European Foot Artillery 10 yrs from 1829 to 1838.......................... | 5,182 | 13 | 3 | 2·50 |
| St. Thomas' Mount, Native Foot Artillery, 9 yrs. from 1829 to 1838 exclusive of 1832............... | 4,417 | 17 | 5 | 3·84 |
| Bellary, inside the fort, European Artillery, 13 yrs. from 1827 to 1839........................... | 1,478 | 44 | 16 | 29·7 |
| Bellary, outside the fort, Native Infantry, ½ mile distant, 13 yrs. from 1827, to 1839 ............... | 33,283 | 302 | 143 | 9·0 |
| * Madras, Europeans, within Fort St. George, for 10 yrs. from 1829 to 1838.... ..................... | 13,981 | 392 | 136 | 28·03 |
| Madras, Natives, without Fort St. George, for 10 yrs. from 1829 to 1838. ............................. | 60,142 | 263 | 140 | 4·37 |

From the different proportions in which it has attacked the two classes of troops in these four cantonments it would appear to be owing to a

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* There probably were a few soldiers of this garrison who did not reside inside the Fort but their numbers are too small to affect the results. In the 7 years from 1832 to 1838 the average annual ratio per 1,000 of mean strength of H. M. Regts. attacked, inside of Fort St. George, with Cholera, was 27·37.

greater susceptibility in the European constitution that the rate of mortality per 1,000, has been so much higher among them than in the native army. In Kamptee 15·9 per 1000 of the European soldiers were admitted, but only 3·0 per 1,000 of their native comrades, and in the town and fort of Madras this greater liability has been very marked, 28·0 per 1,000 of the Europeans having been attacked inside the fort, while of the native soldiers, about a mile distant, at Perambore, Black Town and Vepery, only 4·3 per 1,000 have been seized with it.

A visitation of Epidemic Cholera increases the mortality of the year in which it occurs above that of other years.

There is an opinion prevalent amongst unprofessional men in India, as well as in Great Britain, that a visitation of epidemic cholera does not increase the rate of mortality above the average of a series of years, and it has been stated, as the reason for forming such an opinion, that when cholera prevails other diseases are in abeyance. These returns enable us to test the accuracy of this statement, and they show that in the Bengal and Bombay Presidencies, in the greater number of those years that the proportion of deaths from ordinary diseases was above the average of the period from 1825 to 1844, the ratio of mortality from cholera was, also, higher, and in the majority of the years that cholera deaths were more than the average rate, the deaths from ordinary diseases were so likewise; but the same Returns likewise show that there has been no such correspondence in the Madras Presidency, for, in it, in the greater number of the years when the proportion of the deaths from cholera was more than the average, there was no increase in the deaths from ordinary diseases, nor was the proportion of deaths from cholera generally greater in years when the mortality from ordinary diseases was above the average rate. These points can be observed from the following Table—

## IV

## EUROPEANS.

TABLE showing the Ratio per 1,000 of mean strength that died from ordinary diseases during the years that the Ratio of deaths from Cholera was above the average of the 20 years.

| Bengal. | | | Madras. | | | Bombay. | | |
|---|---|---|---|---|---|---|---|---|
| Years. | Cholera. | Ordinary diseases. | Years. | Cholera. | Ordinary diseases, | Years. | Cholera. | Ordinary diseases. |
| 1833 | 12.0 | 64.4 | 1825 | 13.7 | 104.5 | 1826 | 11.5 | 103.6 |
| 1834 | 16.5 | 74.8 | 1830 | 6.0 | 26.4 | 1828 | 5.8 | 66.0 |
| 1835 | 11.7 | 66.1 | 1831 | 7.6 | 37.1 | 1837 | 6.4 | 54.2 |
| 1838 | 17.4 | 65.3 | 1832 | 7.7 | 28.0 | 1839 | 15.1 | 65.5 |
| 1839 | 15.8 | 61.9 | 1833 | 10.1 | 35.2 | 1840 | 10.1 | 53.9 |
| 1841 | 17.0 | 60.4 | 1839 | 5.7 | 21.7 | 1842 | 19.1 | 35.0 |
| 1843 | 21.3 | 59.4 | 1840 | 5.1 | 27.5 | 1844 | 13.0 | 53.0 |
| 1844 | 17.2 | 57.6 | 1842 | 6.7 | 26.3 | | | |
| | | | 1844 | 6.2 | 19.7 | | | |
| Average. | 16.3 | 63.3 | Average. | 7.5 | 34.8 | Average. | 12.79 | 56.43 |

TABLE showing the Ratio per 1,000 of mean strength that died from Cholera during the years that the Ratio of deaths from ordinary diseases was above the average of the 20 years.

| Bengal. | | | Madras. | | | Bombay. | | |
|---|---|---|---|---|---|---|---|---|
| Years. | Cholera. | Ordinary diseases. | Years. | Cholera | Ordinary diseases | Years. | Cholera. | Ordinary diseases. |
| 1825 | 5.5 | 119.4 | 1825 | 13.7 | 104.5 | 1825 | 0.5 | 45.0 |
| 1827 | 8.9 | 76.6 | 1826 | 2.4 | 70.5 | 1826 | 11.5 | 103.6 |
| 1833 | 12.0 | 64.4 | 1827 | 1.2 | 51.5 | 1827 | 2.6 | 70.7 |
| 1834 | 16.5 | 74.8 | 1828 | 2.4 | 43.9 | 1828 | 5.8 | 66.0 |
| 1835 | 11.7 | 66.1 | 1831 | 7.6 | 37.1 | 1829 | 0.4 | 47.3 |
| 1838 | 17.4 | 65.3 | 1833 | 10·1 | 35.2 | 1835 | 0.0 | 46.2 |
| 1842 | 9.3 | 62.3 | 1834 | 0.4 | 35.2 | 1837 | 6.4 | 54.2 |
| | | | | | | 1839 | 15.1 | 65.5 |
| | | | | | | 1840 | 10.1 | 53·9 |
| | | | | | | 1843 | 0.3 | 53.7 |
| | | | | | | 1844 | 13.0 | 53.4 |
| Average. | 11.6 | 75.8 | Average. | 5.3 | 53.0 | Average. | 5.82 | 53.45 |

The following table, also, taken from Dr. Murray's Report on the treatment of Epidemic Cholera, will show the admissions and deaths from cholera, fevers, and other diseases, in the Bengal Presidency.

| Europeans. | Years. | Strength. | Cholera. | | Fevers. | | Other diseases. | | Total. | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | A. | D. | A. | D. | A | D. | A. | D. |
| 1852-3 to 1857 | 5 | 103,305 | 2,643 | 1,294 | 113,737 | 888 | 122,696 | 3,224 | 239 076 | 5,406 |
| 1858 to 1862 | 5 | 255,265 | 5,105 | 2,946 | 196.074 | 1,755 | 334,644 | 7,019 | 535,823 | 11,720 |
| 1863 to 1867 | 5 | 187,743 | 1,322 | 909 | 104,635 | 586 | 198,533 | 2,658 | 304,490 | 4,154 |
| Native Troops. | | | | | | | | | | |
| 1861 to 1862 | 2 | 57,724 | 586 | 253 | 51,190 | 306 | 44,460 | 614 | 96,236 | 1,173 |
| 1863 to 1867 | 5 | 185,350 | 839 | 429 | 113,576 | 644 | 128,562 | 1,393 | 262,977 | 2,468 |
| Native Prisoners. | | | | | | | | | | |
| 1859 to 1862 | 4 | 196,867 | 6,196 | 2,471 | 100,206 | 6,065 | 158,312 | 8,918 | 264,714 | 17,454 |
| 1863 to 1867 | 5 | 271,620 | 6,141 | 2,557 | 136,775 | 3,590 | 180,343 | 10,883 | 323 259 | 17,030 |

V

## NATIVES.

TABLE showing the Ratio per 1,000 of mean strength that died from ordinary diseases during the years that the ratio of deaths from Cholera was above the average of the 20 years.

| Bengal. | | | Madras. | | | Bombay. | | |
|---|---|---|---|---|---|---|---|---|
| Years. | Cholera. | Ordinary diseases. | Years. | Cholera. | Ordinary diseases. | Years. | Cholera. | Ordinary diseases. |
| 1830 | 2.5 | 17.8 | 1825 | 12.7 | 30.6 | 1825 | 5.820 | 11.910 |
| 1832 | 2,9 | 16.6 | 1833 | 11.6 | 15.6 | 1826 | 4.640 | 13.390 |
| 1833 | 3.2 | 20.5 | 1837 | 7.2 | 14.3 | 1830 | 3.610 | 10.930 |
| 1834 | 3.0 | 23.8 | 1838 | 10.2 | 14.5 | 1833 | 4.490 | 5.510 |
| 1835 | 2.7 | 15.7 | 1842 | 11.6 | 18.0 | 1834 | 3.590 | 4.670 |
| 1836 | 2.7 | 17.8 | 1843 | 13.8 | 12·9 | 1837 | 4.00 | 8.000 |
| 1837 | 2.3 | 11.7 | 1844 | 8.0 | 14.5 | 1838 | 4.770 | 10.550 |
| 1838 | 2.2 | 20,3 | | | | 1839 | 5.16 | 18.690 |
| 1839 | 2.6 | 20.0 | | | | 1840 | 4.95 | 12.96 |
| 1841 | 2.7 | 13.3 | | | | 1842 | 5.98 | 11.43 |
| 1842 | 2.2 | 16.7 | | | | 1843 | 3.42 | 3.49 |
| 1843 | 3.1 | 13.7 | | | | | | |
| 1844 | 2.7 | 11,7 | | | | | | |
| Average. | 2·7 | 16.6 | Average. | 10,9 | 17.4 | Average. | 4·5 | 10·3 |

TABLE showing the Ratio per 1,000 of mean strength that died from Cholera during the years that the Ratio of deaths from ordinary diseases was above the average of the 20 years.

| Bengal. | | | Madras. | | | Bombay. | | |
|---|---|---|---|---|---|---|---|---|
| Years. | Cholera. | Ordinary diseases. | Years. | Cholera. | Ordinary diseases. | Years. | Cholera. | Ordinary diseases. |
| 1825 | 1.4 | 17.3 | 1825 | 12.7 | 30.6 | 1825 | 5.82 | 11.91 |
| 1830 | 2.5 | 17.8 | 1826 | 4.1 | 25.1 | 1826 | 4.64 | 13.39 |
| 1831 | 2,1 | 18.3 | 1834 | 1.1 | 19.5 | 1827 | 0.84 | 12.18 |
| 1832 | 2.9 | 16.6 | 1836 | 0.5 | 24.7 | 1830 | 3.61 | 10.93 |
| 1833 | 3.2 | 20.5 | 1842 | 11.6 | 18.0 | 1838 | 4.77 | 10.55 |
| 1834 | 3.0 | 23.8 | | | | 1839 | 5,16 | 18.69 |
| 1835 | 2.7 | 15.7 | | | | 1840 | 4,95 | 12.96 |
| 1836 | 2,7 | 17.8 | | | | 1841 | 0.78 | 12.16 |
| 1838 | 2.2 | 20.3 | | | | 1842 | 5.98 | 11.43 |
| 1839 | 2.6 | 20.0 | | | | 1844 | 1.58 | 11.93 |
| 1842 | 2.2 | 16.7 | | | | | | |
| Average. | 2,4 | 18·5 | Average. | 6·4 | 23·7 | Average | 3·3 | 12·6 |

It would appear from Table, IV that when the ratio of mortality from cholera was above the average of the 20 years,

Amongst the Europeans,
There were 4 years out of 8 that the rate from ordinary diseases, likewise, was in excess in Bengal.
There were 3 years out of 9 that the rate from ordinary diseases, likewise, was in excess in Madras.
There were 6 years out of 7 that the rate from ordinary diseases, likewise, was in excess in Bombay.
being a total of 13 years out of 24 in the three presidencies.

Amongst the Natives,
There were 9 years out of 13 that the rate from ordinary diseases, likewise, was in excess in Bengal.
There were 2 years out of 5 that the rate from ordinary diseases, likewise, was in excess in Madras.
There were 6 years out of 10 that the rate from ordinary diseases, likewise, was in excess in Bombay.
being a total of 17 years out of 28 in the three presidencies.

And when the rate of mortality from ordinary diseases was above the average of the 20 years.

Amongst the Europeans,
There were 4 years out of 7 that the rate from cholera, likewise, was in excess in Bengal.
There were 3 years out of 7 that the rate from cholera, likewise, was in excess in Madras.
There were 6 years out of 11 that the rate from cholera. likewise, was in excess in Bombay.
being a total of 13 years out of 25 in the three presidencies.

Amongst the Natives,
There were 9 years out of 11 that the rate from cholera, likewise, was in excess in Bengal.
There were 2 years out of 5 that the rate from cholera, likewise, was in excess in Madras.
There were 7 years out of 10 that the rate from cholera, likewise, was in excess in Bombay.
being a total of 18 years out of 26 in the three presidencies.

It will be observed from the above that in the Bengal and Bombay armies an unusual prevalence of cholera has been occasionally attended with a greater mortality from other diseases, whilst the mortality from Cholera and other diseases, among the Europeans and Natives of the Madras army have rarely been thus associated, although in the series of years the average rate of mortality has been greater in all the Presidencies. This will be observed by the following numerical statement taken from the preceding Tables to allow a more ready reference :

TABLE VI.—Showing the average annual Ratio per 1,000 of mean strength that died.

| Average annual ratio per 1,000 of mean strength that died. | Of Europeans. | | | | | | | | | Of Natives. | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Bengal. | | | Madras. | | | Bombay. | | | Bengal. | | | Madras. | | | Bombay. | | |
| | Cholera. | Ordinary Diseases. | Total. | Cholera. | Ordinary Diseases. | Total. | Cholera. | Ordinary Diseases. | Total. | Cholera. | Ordinary Diseases. | Total. | Cholera. | Ordinary Diseases. | Total. | Cholera. | Ordinary Diseases. | Total. |
| In the 20 years from 1825 to 1844........ | 11·5 | 62·3 | 73·8 | 4·2 | 34·3 | 38·4 | 5·6 | 45·1 | 50·7 | 2·1 | 15·7 | 17·9 | 6·0 | 15·6 | 21·6 | 2·8 | 10·1 | 12·9 |
| During the years when the ratio of deaths from ordinary diseases was above the average of the 20 years. | 11·6 | 75·8 | 87·4 | 5·3 | 53·0 | 58·4 | 5·8 | 58·4 | 64·2 | 2·4 | 18·5 | 20·9 | 6·4 | 23·7 | 30·1 | 3·3 | 12·6 | 15·9 |
| During the years when the ratio of deaths from cholera was above the average of the 20 years. | 16·3 | 63·3 | 79·6 | 7·5 | 34·8 | 42·4 | 12·79 | 56·4 | 69·1 | 2·7 | 16·6 | 19·3 | 10·9 | 17·4 | 28·3 | 4·5 | 10·3 | 14·9 |

It may be observed from the previous table that in the average of the series of years when cholera deaths were in excess, the mortality from all other diseases was somewhat increased above the average of the 20 years, both among the Europeans and Natives in all the three presidencies, and an examination of the most recent tabular statements available shows that this correspondence continues to the present day.

What are the admissions from all "diseases" during years when the ratio of deaths from cholera is above the average?

The following table will enable an opinion to be formed as to the frequency of admissions into hospital in the years that the ratio of deaths from cholera has been greater than in the period under review.

TABLE VII.—Showing the ratio per 1,000 of mean strength admitted into hospital from "all diseases" in the three Presidencies during the years that the ratio of deaths from cholera was above the average of the 20 years.

| EUROPEANS. | | | | | | | | | NATIVES. | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BENGAL. | | | MADRAS. | | | BOMBAY. | | | BENGAL. | | | MADRAS. | | | BOMBAY. | | |
| Years. | Total admissions from all diseases, | Ratio per 1,000 of mean strength admitted. | Years. | Total admissions from all diseases | Ratio per 1,000 of mean strength admitted. | Years. | Total admissions from all diseases. | Ratio per 1,000 of mean strength admitted. | Years. | Total admissions from all diseases. | Ratio per 1,000 of mean strength admitted. | Years. | Total admissions from all diseases. | Ratio per 1,00. of mean strength admitted. | Years. | Total admissions from all diseases. | Ratio per 1,000 of mean strength admitted. |
| 1833 | 6979 | 1653·7 | 1825 | 7842 | 1802· | 1826 | 4764 | 2758· | 1830 | 47,138 | 503· | 1825 | 73,273 | 1182. | 1825 | 39,041 | 958· |
| 1834 | 8738 | 2295·8 | 1830 | 6300 | 1196·5 | 1828 | 6178 | 2774· | 1832 | 46,622 | 591· | 1833 | 35,915 | 720. | 1826 | 37,161 | 942. |
| 1835 | 7589 | 1858·2 | 1831 | 5786 | 1086· | 1837 | 5530 | 2971· | 1833 | 38,183 | 479· | 1837 | 36,793 | 757. | 1830 | 28,537 | 980. |
| 1838 | 8514 | 1978·6 | 1832 | 5234 | 1042· | 1839 | 3157 | 1545· | 1834 | 63,805 | 807· | 1838 | 37,490 | 766. | 1833 | 20,652 | 801. |
| 1839 | 6449 | 1573·6 | 1833 | 7288 | 1537· | 1840 | 3606 | 1518· | 1835 | 53,584 | 677· | 1842 | 53,170 | 833. | 1834 | 24,350 | 910. |
| 1841 | 11202 | 2357·8 | 1839 | 5332 | 1135· | 1842 | 2039 | 433·2 | 1836 | 34,116 | 426· | 1843 | 47,508 | 727. | 1837 | 21,838 | 773. |
| 1843 | 9339 | 1861·8 | 1840 | 7590 | 1504· | 1844 | 6266 | 1708· | 1837 | 39,626 | 490· | 1844 | 48,599 | 753. | 1838 | 22,675 | 866. |
| 1844 | 8929 | 1773·8 | 1842 | 8099 | 1331· | | | | 1838 | 46,354 | 659· | | | | 1839 | 30,104 | 1049. |
| | | | 1844 | 5744 | 976· | | | | 1839 | 42,632 | 451· | | | | 1840 | 29,956 | 1131. |
| | | | | | | | | | 1841 | 73,636 | 696· | | | | 1642 | 30,465 | 1151. |
| | | | | | | | | | 1842 | 98,936 | 876. | | | | 1843 | 28,550 | 896. |
| | | | | | | | | | 1843 | 95,323 | 830· | | | | | | |
| | | | | | | | | | 1844 | 91,751 | 757· | | | | | | |
| 8 years | 67,739 | 1918 2 | 9 years | 59,215 | 1276·4 | 8 years | 31,540 | 1695·2 | 13 years | 771,706 | 641.6 | 7 years | 332,748 | 826·7 | 11 years | 313,329 | 946· |
| Average Annual Ratio per 1,000 in the 20 years. | | 1857 | | | 1341. | | | 1724· | | | 537· | | | 782· | | | 917· |

It is possible that the existing opinion, alluded to at page 8, that a visitation of cholera in an epidemic form does not increase the mortality of the year above the average of a period, may have been entertained from drawing general conclusions from the number of admissions in some particular country. But the erroneous belief may also have been entertained from regarding sickliness and mortality as always coincident, as it will be observed from the preceding table that on the average of the years when cholera was more than usually prevalent, the ratio of admissions from all diseases, among the Europeans in the Madras and Bombay Presidencies, has been even lower than the average of the 20 years ; and even in the Bengal Presidency, the average annual proportion of admissions was very triflingly increased.

Is disease generally more prevalent when cholera appears ?

Colonel Tulloch, at page 52 of the Ceylon Report, notices as a feature in cholera that of making its appearance at the otherwise unhealthy periods of the year. Cholera, has generally occurred, as an epidemic, in that colony in the months of April and May, or again in November and December, and he remarks that "the out-breaks of remittent fever and cholera in these months have only been in accordance with the usual law of epidemics which generally make their appearance at those seasons of the year which are otherwise the most unhealthy." If disease generally be alluded to, here, this feature is not observable as a characteristic of cholera as it occurs in the Madras Presidency, where, whether the year be examined in half yearly or quarterly periods, cholera seems often to have been more frequent when diseases generally were less so.

The Madras Reports show that in the 10 years from 1829 to 1838, cholera occurred among the Madras troops as follows :

## TABLE VIII.

| EUROPEANS. AGGREGATE STRENGTH 103,431 | | | | | | | | NATIVES. AGGREGATE STRENGTH 568,403. | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1ST HALF-YEAR. | | | | 2ND HALF-YEAR. | | | | 1ST HALF-YEAR. | | | | 2ND HALF-YEAR. | | | |
| Total Admitted by | | Ratio per 1,000 of mean strength admitted by | | Total admitted by | | Ratio per 1,000 of mean strength admitted by | | Total admitted by | | Ratio per 1,000 of mean strength admitted by | | Total admitted by | | Ratio per 1,000 of mean strength admitted by | |
| Cholera. | All other diseases. | Cholera. | All other diseases. | Cholera. | All other diseases. | Cholera. | All other diseases. | Cholera. | All other diseases. | Cholera. | All other diseases. | Cholera. | All other diseases. | Cholera. | All other diseases. |
| 1757 | 87,142 | 16·9 | 841· | 1076 | 96,890 | 10·4 | 936· | 3253 | 169,627 | 5·7 | 298· | 2091 | 172.354 | 3·6 | 303· |

And the quarterly Reports of Dr. Nicholson's Tables demonstrate the same.

TABLE IX.—Showing the Ratio per 1,000 of mean strength of H. M. Regiments, serving in the Madras Presidency admitted by cholera and by all diseases in the four quarters of the year.

| STATIONS. | PERIOD. | Average Ratio per 1,000, of admissions by Cholera. | | | | | Average Ratio per 1,000 of mean strength admitted from all diseases. | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1st Quarter. | 2nd Quarter. | 3rd Quarter. | 4th Quarter. | Average of the year. | 1st Quarter. | 2nd Quarter. | 3rd Quarter. | 4th Quarter. | Average of the year. |
| Bangalore,............ | for 18 years, from 1826 to 1843 inclusive... | 1.5 | 12.5 | 1.4 | 1.4 | 17.4 | 386.2 | 455.6 | 400.3 | 377.6 | 1023.9 |
| Moulmein,............ | for 17 years, from 1827 to 1843 ... ...... | 2.1 | 2.9 | 0.3 | 0.06 | 5.3 | 333.3 | 443.4 | 383.5 | 406.6 | 1572.6 |
| Arnee,........... ...... | for 7 years, from 1828 to 1830; 1835 to 1836; 1838, and from October 1842 to February 1843 | 40.3 | 2.1 | 1.5 | 2.6 | 48.6 | 404.3 | 358.3 | 370.1 | 404.7 | 1546·1 |
| Fort St. George,... | for 18 years, from 1826 to 1843......... ...... | 2.8 | 2.0 | 7.7 | 5.6 | 18.7 | 374.7 | 508.2 | 495.9 | 512.3 | 1905.2 |
| Bellary................ | for 18 years, from 1826 to 1843 .. ... ......... | 6.7 | 23.0 | 2.5 | 13.8 | 47.0 | 490.3 | 576.7 | 528.9 | 593.1 | 2192.0 |
| Belgaum...... ...... | for 6 years, from 1827 to 1828, and from January 1839 to October 1842..................... ................ | 0.0 | 0.0 | 0.0 | 0.27 | 0.1 | 543.0 | 559.4 | 428.0 | 528.7 | 3057.6 |
| Secunderabad........ | for 16 years, from 1826 to 1840 and from February to December 1843...................... ............... | 1.1 | 1.5 | 1.2 | 0.0 | 3.9 | 573.6 | 513.6 | 535.2 | 572.0 | 2191.6 |
| Trichinopoly,........ | for 18 years, from 1826 to 1843...... ......... | 9.1 | 1.6 | 1.2 | 2.1 | 13.9 | 422.4 | 486.9 | 485.0 | 482.5 | 1878.1 |
| Kamptee,... ... ... | for 2 years, for 1840 and from February to December 1843.......................... ............... ......... | 0.8 | 0.3 | 0.4 | 1.9 | 3.6 | 406.9 | 556.7 | 615.3 | 557.7 | 2168.5 |
| Cannanore,......... | for 18 years, from 1826 to 1843................... | 0.2 | 0.08 | 1.8 | 0.2 | 2.4 | 415.2 | 382.3 | 419.2 | 460.2 | 1661.2 |
| Arcot,............... | for 8 years, from July 1826 to March 1828 and from September 1842 to February 1843.............. ...... | 1.8 | 6.8 | 3.1 | 58.9 | 93.4 | 754.5 | 513.6 | 510.7 | 696.7 | 2438.1 |

In two out of eleven stations in the Madras Presidency, viz. in Bangalore and Moulmein, the greatest proportion of admissions from cholera and from all diseases, occurred in the same quarter of the year, and in Arneo the two quarters preceding the great cholera quarter were very unhealthy; but in the remaining eight stations there has been no coincidence.

Are particular classes of diseases more frequent at the time when cholera appears?

Colonel Tulloch's remark regarding cholera making its appearance at the unhealthy periods of the year is, however, probably in allusion to other of the severer diseases. Indeed formerly writers have maintained that cholera, rheumatism, dysentery and fever, are modifications of disease, or at least that these all arise from the same cause; Though such a doctrine seems untenable, when Dr. Nicholson's tables are examined to ascertain the prevalence of other severer diseases, while cholera is present, there is a degree of connexion observable as to the seasons of the year at which they occur.

Amongst the European soldiers in the Madras cantoments, for instance; as will be observed from the following table, an unusual prevalence of cholera, has in nine stations out of eleven, had, in the quarter preceding, accompanying, or following the out-break, a greater than the average quarterly proportion of fevers, liver-disease, dysentery and diarrhœa:

TABLE X.—Showing the Average Annual Ratio per 1,000 of Mean Strength admitted.

| Stations. | Diseases. | IN THE QUARTER. | | | | Total of the year. |
|---|---|---|---|---|---|---|
| | | 1st. | 2nd. | 3rd. | 4th. | |
| Arcot...... ... | Cholera......... | 1.8 | 6.8 | 3.1 | 58.9 | 93.4 |
| | Fevers......... | 61.3 | 131.4 | 57.3 | 78.1 | 302.1 |
| | Liver-disease .... | 74.0 | 61,4 | 35.9 | 47.0 | 193.5 |
| | Dysentery......... | 106.5 | 56.3 | 54.7 | 109.9 | 325 7 |
| | Diarrhœa ..... | 1.8 | 1.7 | 19,5 | 39.7 | 87.8 |
| | Rheumatism,.... | 28. 9 | 30.7 | 20.1 | 23.8 | 96.3 |
| Arnee......... | Cholera......... | 40.3 | 2.1 | 1.5 | 2.6 | 48.6 |
| | Fevers......... | 44.8 | 63.1 | 44.3 | 75.0 | 237.9 |
| | Liver-disease .. | 27,2 | 25.1 | 22.1 | 19.6 | 94.2 |
| | Dysentery...... | 44.3 | 48.3 | 52.7 | 55.5 | 200.4 |
| | Diarrhœa....... | 23.2 | 24.0 | 20.1 | 30.5 | 101.4 |
| | Rheumatism. .. | 23.7 | 14.2 | 10.0 | 22.3 | 74.7 |
| Bellary......... | Cholera....... | 6.7 | 23.0 | 2.5 | 13.8 | 47,0 |
| | Fevers ........ | 124.9 | 176.6 | 81.9 | 160.4 | 545.8 |
| | Liver-disease. .. | 25.4 | 24.3 | 30.4 | 23,9 | 104.2 |
| | Dysentery...... | 31.5 | 33.2 | 46,0 | 56.4 | 166.4 |
| | Diarrhœa....... | 12.3 | 27.3 | 21.7 | 26.0 | 88.1 |
| | Rheumatism. ... | 29.9 | 31.6 | 38.5 | 30.4 | 130.8 |
| Fort St. George. | Cholera........ | 2.8 | 2.0 | 7.7 | 5.6 | 18.7 |
| | Fevers......... | 62.9 | 126.0 | 88.5 | 99.8 | 380.6 |
| | Liver-disease..... | 20.3 | 27.7 | 26.3 | 22.2 | 96.9 |
| | Dysentery ...... | 50.8 | 53.5 | 68.2 | 76,5 | 251.5 |
| | Diarrhœa ...... | 21.2 | 26.1 | 33.0 | 37.0 | 119.0 |
| | Rheumatism ...... | 23.9 | 30.0 | 25.8 | 25.7 | 105.6 |
| Bangalore....... | Cholera ........ | 1.5 | 12,5 | 1.4 | 1.4 | 17.4 |
| | Fevers.......... | 42.3 | 52.0 | 42.4 | 40.4 | 177.7 |
| | Liver-disease..... | 24.4 | 30.4 | 25.7 | 23.6 | 104.6 |
| | Dysentery...... | 24.1 | 47.0 | 39,0 | 25.5 | 137.6 |
| | Diarrhœa....... | 5.2 | 20.2 | 7.2 | 51,5 | 38.9 |
| | Rheumatism..... | 17.0 | 18.2 | 18.8 | 17.4 | 71.6 |

| Stations. | Diseases. | QUARTER. | | | | Total of the year. |
|---|---|---|---|---|---|---|
| | | 1st | 2nd. | 3rd. | 4th. | |
| Trichinopoly .... | Cholera......... | 9.1 | 1.6 | 1.2 | 2.1 | 13.9 |
| | Fevers ......... | 74.5 | 92.4 | 98.6 | 107.1 | 372.1 |
| | Liver-disease .... | 20.4 | 24.6 | 25.8 | 19.6 | 90.9 |
| | Dysentery...... | 37.5 | 48.6 | 47.9 | 46.2 | 180.6 |
| | Diarrhœa ..... | 17.2 | 21.6 | 15.6 | 15.9 | 70.4 |
| | Rheumatism..... | 20.2 | 15.9 | 19.8 | 23.0 | 78.9 |
| Moulmein.. .... | Cholera......... | 2.1 | 2.9 | 0.3 | 0.06 | 5.3 |
| | Fevers......... | 76.8 | 113.4 | 93.8 | 80.8 | 365.8 |
| | Liver-disease ... | 19.1 | 24.5 | 20.6 | 16.9 | 81.3 |
| | Dysentery ... ... | 25.6 | 52.2 | 54.1 | 38.9 | 171.8 |
| | Diarrhœa...... | 19.0 | 45.8 | 27.2 | 31.7 | 124.5 |
| | Rheumatism.... | 18.2 | 17.2 | 20.7 | 16.5 | 72.8 |
| Secunderabad ... | Cholera......... | 1.1 | 1.5 | 1.2 | 0.0 | 3.9 |
| | Fevers........... | 362.3 | 143.5 | 154.2 | 227.0 | 684.1 |
| | Liver-disease..... | 43.2 | 38.8 | 39.5 | 39.9 | 161.5 |
| | Dysentery......... | 69.2 | 55.1 | 89.8 | 78.7 | 291.3 |
| | Diarrhœa ...... | 19.4 | 23.5 | 31.9 | 25.0 | 100.1 |
| | Rheumatism...... | 23.6 | 20.8 | 22.4 | 20.8 | 87.7 |
| Kamptee. | Cholera......... | 0.8 | 0.3 | 0.4 | 1.9 | 3.6 |
| | Fevers...... ..... | 86.5 | 238.5 | 263.3 | 251.4 | 852.1 |
| | Liver-disease ..... | 14.2 | 17.0 | 16.9 | 12.0 | 60.1 |
| | Dysentery ........ | 20.2 | 20.2 | 54.7 | 27.4 | 123.5 |
| | Diarrhœa......... | 24.9 | 32.1 | 31.9 | 18.8 | 107.5 |
| | Rheumatism....... | 34.4 | 23.4 | 37.5 | 31.1 | 122.3 |
| Belgaum ...... | Cholera........... | 0.0 | 0.0 | 0.0 | 0.27 | 0.1 |
| | Fevers....... ... | 66.6 | 63.5 | 44.6 | 91.03 | 369.3 |
| | Liver-disease..... | 41.6 | 37.03 | 32.6 | 26.3 | 135.8 |
| | Dysentery......... | 53.1 | 75.3 | 60.1 | 67.1 | 256.7 |
| | Diarrhœa ......... | 27.4 | 37.3 | 16.1 | 46.9 | 130.1 |
| | Rheumatism...... | 43.3 | 49.1 | 44.6 | 44.1 | 181.1 |
| Cannanore .... | Cholera........... | 0.2 | 0.08 | 1.8 | 0.2 | 2.4 |
| | Fevers............. | 50.6 | 50.5 | 49.3 | 54.2 | 204.7 |
| | Liver-disease...... | 26.4 | 26.4 | 23.3 | 23.9 | 100.1 |
| | Dysentery......... | 62.3 | 73.7 | 84.3 | 72.9 | 293.0 |
| | Diarrhœa ......... | 13.9 | 20.6 | 13.8 | 13.0 | 61.5 |
| | Rheumatism...... | 16.4 | 22.7 | 21.5 | 17.8 | 78.4 |

In five cantonments, the great cholera quarters of the year were preceded by the quarters of greatest fever ; in four cantonments, the greatest fever quarters and greatest cholera quarters were coincident ; and only in two cantonments there was no apparent correspondence. In four cantonments, the quarter of greatest rate of liver-disease preceded the greatest cholera quarter ; in three cantonments, the highest rates of liver-disease and of cholera were coincident ; in three cantonments, the quarter of greatest rate of liver-disease followed that of cholera, and only in one cantonment no coincidence is observable ; and, pursuing this subject, we observe that in 10 stations out of 11, the quarters of the year in which most cholera occurred were either immediately preceded, accompanied, or immediately followed by the quarters in which the greatest rate of dysentery and diarrhœa occurred. Among the European soldiers in the Madras Presidency, then, it would seem that there is a certain connexion, as regards season of the year, in the occurrence of the severer classes of diseases, viz. fever, liver-disease, dysentery, diarrhœa, and cholera.

The same result is obtained by an examination of the Appendix F. which is given by Inspector General Macpherson in Vol. ii of the Royal Commission. That tabular statement gives sixteen years of admissions and deaths from the severer diseases in the Madras European Army (See Appendix F.) In those 16 years, there were six years viz. 1842 ; 1843 ; 1845 ; 1846 ; 1852-3 and 1857-8, in which the attacks and deaths from cholera were greater than the average of the period ; and in all those six years, the deaths from diseases generally and from fevers were also above the average ; in five of the six years, the deaths from liver-disease, diarrhœa dysentery and dropsy were also above the average —There were ten years in which cholera deaths were under the average, in nine of which the deaths from all diseases and fevers were also under ; in eight out of the ten years, diarrhœa deaths were less numerous : and in seven out of the ten, the deaths from dysentery and liver-disease, were less numerous The subject merits further and more minute investigation, as it bears on several important questions which are constantly discussed connected with this disease, its cause or causes, its communicability, and the means of curing it.

The valuable cholera report on the Madras Native army, by Assistant Surgeon Lorimer, furnishes the ratio per 1,000 of their mean strength admitted and died from cholera, fevers, dysentery and diarrhœa, and other diseases, and the following table has been arranged from that report to assist in determining if fevers and bowel-complaints be more frequent amongst native soldiers in those divisions of the Madras army where cholera is more prevalent, than in the divisions where the proportion admitted from cholera is small.

Table XI showing the Admissions and Deaths from Cholera, amongst the Native Troops in each Division of the Madras Army from 1821 to 1844, inclusive,—the ratio of admissions and deaths to strength per 1000 and the ratio of deaths to admissions.

| DIVISIONS. | PERIOD. | Aggregate Strength. | TOTAL ADMISSIONS. | | | | | TOTAL DEATHS. | | | | | RATIO PER 1,000 OF MEAN STRENGTH. | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | Cholera. | | Fevers. | | Dysentery and Diarrhœa. | | All other Diseases. | | Total from all Diseases. | |
| | | | Cholera. | Fevers. | Dysentery and Diarrhœa. | All other Diseases. | Total. | Cholera. | Fevers. | Dysentery and Diarrhœa. | All other Diseases. | Total. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. | Admitted. | Died. |
| Not specified. | 6 years from 1821 to 1826... | 9,385 | 527 | 4,429 | 894 | 1,103 | 6,953 | 160 | 64 | 23 | 13 | 260 | 56· | 17·0 | 471. | 6·8 | 95· | 2·4 | 117· | 1·3 | 740· | 27·7 |
| Field Force Doab | 10 years from 1821 to 1830... | 59,314 | 1,415 | 14,893 | 2,556 | 16,993 | 35,857 | 559 | 143 | 109 | 308 | 1119 | 23· | 9.4 | 251· | 2·4 | 43· | 1·8 | 286· | 5·1 | 604· | 18·8 |
| Ceded Districts | 24 years from 1821 to 1844... | 102,110 | 2,388 | 21,432 | 2,493 | 29,852 | 56,165 | 923 | 276 | 99 | 498 | 1796 | 23· | 9·0 | 209· | 2·7 | 21. | 0·9 | 292· | 4·8 | 550· | 17·5 |
| Hyderabad Subsidiary Force and Jaulnah. | 24 years from 1821 to 1844... | 222,290 | 444,8 | 61217 | 6,124 | 61,192 | 132,981 | 1666 | 790 | 304 | 1060 | 3820 | 20· | 7·4 | 275· | 3·5 | 27· | 1·3 | 275· | 4·7 | 598. | 17·1 |
| Southern Division | 24 years from 1821 to 1844. | 163,690 | 2,932 | 32,422 | 5,987 | 55,721 | 97,062 | 1254 | 427 | 349 | 873 | 2903 | 17· | 7·6 | 198· | 2·6 | 36· | 2·1 | 340· | 5·3 | 531· | 17·7 |
| Southern Mahratta Country | 7 years from 1838 to 1844. | 42,527 | 731 | 7,349 | 1,407 | 18,219 | 27,706 | 286 | 76 | 37 | 167 | 566 | 17· | 6·7 | 172· | 1·7 | 33· | 0·8 | 428· | 3·9 | 651· | 13·2 |
| Centre Division | 24 years from 1821 to 1844. | 178,264 | 2,287 | 28,731 | 6,235 | 53,774 | 91,027 | 950 | 494 | 392 | 1401 | 3237 | 12· | 5·3 | 161· | 2·2 | 34· | 2·1 | 301· | 8·8 | 510· | 18·1 |
| Mysore Division | 24 years from 1821 to 1844... | 194,170 | 2,294 | 63,810 | 6,664 | 56,236 | 129,004 | 962 | 898 | 424 | 1043 | 3327 | 11· | 4·9 | 328· | 4·6 | 34· | 2·1 | 289· | 5·3 | 664· | 17·1 |
| Northern Division | 24 years from 1821 to 1844. | 205,387 | 2,220 | 66,018 | 5,542 | 69,816 | 143,596 | 890 | 1148 | 431 | 1773 | 4242 | 10· | 4·3 | 321· | 5·5 | 22· | 2·0 | 339· | 8·6 | 699· | 20·5 |
| Presidency Division | 24 years from 1821 to 1844... | 148,779 | 1,281 | 21,182 | 4,618 | 45,186 | 72,267 | 540 | 306 | 382 | 967 | 2195 | 8· | 3·6 | 142· | 2·0 | 31· | 2·5 | 303· | 6·4 | 485· | 14·7 |
| Travancore Province | 7 years from 1821 to 1827. | 19,823 | 149 | 2,155 | 422 | 8,400 | 11,126 | 33 | 33 | 19 | 107 | 192 | 7· | 1·6 | 108· | 1·6 | 21· | 0·9 | 423· | 5·3 | 560· | 9·6 |
| Malabar and Canara | 19 years from 1826 to 1844. | 75,581 | 368 | 7,760 | 2,183 | 37,500 | 47,811 | 130 | 141 | 144 | 447 | 862 | 4·8 | 1·7 | 102· | 1·8 | 28· | 1·9 | 496· | 5·9 | 632. | 11·2 |
| Nagpore Subsidiary Force | 24 years from 1821 to 1844. | 119,255 | 429 | 40,279 | 2,179 | 27,911 | 70,798 | 211 | 468 | 90 | 620 | 1389 | 3·5 | 1·8 | 337· | 3·9 | 19· | 0.7 | 234· | 5·1 | 593· | 11·6 |
| Eastern Settlements, China, Sind, Aden and the Tenasserim Coast | | 114,661 | 878 | 48,524 | 20,260 | 66,893 | 136,555 | 272 | 682 | 1195 | 2081 | 4230 | | | | | | | | | | |
| | Total... | 1,655,236 | 22,347 | 420,201 | 67,564 | 548,796 | 1,058,908 | 8836 | 5946 | 4098 | 11,258 | 30,138 | 13·5 | 5.3 | 253·8 | 3·5 | 40·8 | 2·4 | 331·5 | 6·8 | 639· | 18·2 |

The intensity of attacks with reference to the ages will be seen by a Statement showing the relation of age to mortality from cholera, and from all other causes among British Soldiers in the Bengal Presidency during the five years 1863 to 1867. (Bengal Sanitary Commission Report p. 128-4.)

| | CHOLERA. | | | | FROM ALL OTHER CAUSES. | | | |
|---|---|---|---|---|---|---|---|---|
| Years. | Under 20 | 20-4 | 25-9 | 30 and upwards. | under 20. | 20-24 | 25-29 | 30 and upwards. |
| 1863 | 1·49 | 4·91 | 3·68 | 2·50 | 5·98 | 13·95 | 24·46 | 26·16 |
| 1864 | 3·97 | 1·82 | 2·71 | 2·21 | 9·92 | 9·51 | 20·78 | 27·54 |
| 1865 | 2·07 | 1·98 | 3·59 | 3·54 | 6·20 | 10·35 | 21·15 | 34·78 |
| 1866 | 0·00 | 1·00 | 1·39 | 1·28 | 4·80 | 10·78 | 16·60 | 26·03 |
| 1867 | 12·81 | 15·82 | 11·65 | 12·99 | 3·90 | 10·63 | 14·19 | 26·25 |
| Average of deaths from cholera during the five years. | 4·06 | 5·10 | 4·60 | 4·50 | 6·16 | 11·04 | 19·43 | 28·15 |

With increasing years, the rate of deaths from all other diseases steadily increases, but cholera seems to strike down all ages at almost the same rate.

The other remarkable point, however, is noticed in running the eye up the two columns of the following table, where it will be readily observed how little variation occurs, one year with another, in the proportion of cases that recover. In twenty-seven out of the 48 years of the Madras European returns the proportion was one death in every two, three, or four cases admitted; and, in forty out of the 48 years, amongst the native soldiers, the proportion has been one death in every 2·0 to 2·9 cases admitted. In the whole period the Europeans lost one case in every 3·5, and the natives one in every 2·5. Though it is evident that the proportion of the European soldiers who now recover from an attack is less than in former years:—

the fewest admissions from cholera there have been the fewest from fevers ; Indeed (excepting in the Mysore, Northern and Nagpore Divisions) the proportion annually attacked with cholera and with fever seems to increase and decrease together. Is this a mere casual coincidence or is there some unknown connection between fevers and cholera ? Taking into consideration what was observed from Dr. Nicholson's tables,—viz. that out of the eleven stations of which they furnish the diseases, in five of them, the quarters of the year of greatest cholera had the greatest fever quarters immediately preceding ; in four, the quarters of greatest cholera and of greatest fever were coincident, and only in two stations was there no correspondence,—it may, at least, be allowed that this coincidence as to seasons of the year in the occurrence of much febrile disease with cholera, amongst the European and native soldiers of the Madras army, has been sufficiently frequent to induce the subject being further investigated. To be correctly determined, however, the monthly admissions and deaths in each Cantonment should be examined one month with another, for it may justly be objected that quarterly periods, besides being too extended for such a delicate inquiry, are given above for a series of years, and therefore no correct deductions can be drawn from them. The subject merits further investigation, however, and some one in possession of the necessary documents might, with advantage, undertake it.

Intensity of cholera.

On examining the Returns from the European soldiers this disease appears to have been increasing in virulence from the period of its last out-break. In the case of the native soldiers of the Madras army the proportion of deaths to admissions continues nearly the same as in the earlier years of its re-appearance.

Its intensity in the two classes of troops viz : the European and native soldiers.

In the 26 years from 1821 to 1846, of 8382 European soldiers of the Madras army admitted with cholera, 2494 died, or one death occurred in every 3·3 admissions ; and 26,716 native soldiers were attacked in the same period of whom 10,752 died, being one death in every 2·4 admissions.

The recent Reports from the various Sanitary Commissioners show that the intensity of the attacks and the liability to be attacked vary with race, age, and sex but that latterly its severity has been on the increase with Europeans.

The per centage of deaths from cholera, amongst the European Troops, is quoted as having risen in Bengal between 1818 and 1854, from 26·7 to 42·0; in Bombay, during the same period from 18·5 to 43·2; and in Madras between 1829 and 1851 from 27·1 to 62·3.

The action on races can be examined, in the following Statement showing the proportion of deaths to cases of Cholera among European Troops, Native Troops, and Prisoners (Bengal Sanitary Commissioner's Report 1867 p. 126.)

| Years. | Died per 1,000 of admissions. | | | |
|---|---|---|---|---|
| | European Troops. | Native Troops. | Prisoners in jails. | |
| 1854-5 | 505·4 | | 392·9 | |
| 1855-6 | 500·0 | | 475·0 | |
| 1856-7 | 536·2 | | 459·5 | |
| 1858 | 543·3 | | 411·8 | |
| 1859 | 501·7 | 376·7 | 465·7 | |
| 1860 | 532·5 | 463·3 | 375·5 | |
| 1861 | 640·4 | 419·0 | 416·3 | |
| 1862 | 612 8 | 502·8 | 363·6 | |
| 1863 | 751·1 | 570·0 | *401·0 | *At page 24 of 1864-5 this is given as 365. |
| 1864 | *695·9 | 439·7 | 373·1 | *At page 24 of 1864-5 this is given as 726. |
| 1865 | 725·0 | 497·3 | 456·9 | |
| 1866 | 600·0 | 546·0 | 443 3 | |
| 1867 | 660·7 | 508·2 | 428·8 | |
| Average. | 595 or 1 in every 1·6 | 480·3 or 1 in every 2·08. | 420·2, or 1 in every 2·3. | |

The above table shows that in Bengal, fewer now recover of the European soldiers who are attacked with cholera, than of the natives, the rates being 1 in every 1·6, to 1 in every 2·08: and 2·3 and it also shows that since 1821, inclusive, the disease amongst Europeans has become more fatal. The cause of the increased rate of mortality is not shown. From my own observation, sanitary preventive measures have latterly seemed to be regarded as of primary consideration, and curative means less esteemed.

But the same is shown by the (Bengal Sanitary Commission Report p. 127) following Statement exhibiting the comparative prevalence of cholera among European and Native Soldiers in the Bengal Presidency from 1861 to 1867;

| Ratio per 1,000 of mean Strength. | | | | | | |
|---|---|---|---|---|---|---|
| Years. | European Soldiers | | Native Soldiers | | Prisoners | |
| | Ad. | died. | Ad. | died. | Ad. | died. |
| 1861 | 37·1 | 23·73 | 9·8 | 4·09 | 36·5 | 15·21 |
| 2 | 15·7 | 9·61 | 5·0 | 2·51 | 15·2 | 5·52 |
| 3 | 5·5 | 4·09 | 2·6 | 1·52 | 35·8 | 14·33 |
| 4 | 3·7 | 2·55 | 3·8 | 1·67 | 22·9 | 8·56 |
| 5 | 4·3 | 3·12 | 5·7 | 2·83 | 15·8 | 7·19 |
| 6 | 2·3 | 1·37 | 4·7 | 2·54 | 27·2 | 12·10 |
| 7 | 20·9 | 13·78 | 6·2 | 2·96 | 11·5 | 4·94 |

Its action on the sexes, amongst Europeans in Bengal (Bengal Sanitary Reports 1864-5 to 1867) will be seen in the comparative mortality from cholera and all other causes among men and women and children for the four years ending with 1863.

| Europeans died in hospital per 1,000 of average strength. | | | |
|---|---|---|---|
| 1860 to 1863. | Men. | Women. | Children. |
| Cholera. | 11·5 | 17·4 | 16·4 |
| All other Causes. | 18·8 | 32·2 | 74·0 |
| Total... | 30·3 | 49·6 | 90·4 |

It is shown from the above that while men, compared with women and children, suffered least from all diseases, and while compared with men the mortality amongst women from ordinary diseases is nearly double that of men, and the mortality of children is four-fold that of men, the rate of deaths from cholera with women and children is nearly alike. The details of the above abstract are as follow:

| Europeans died from Cholera in Bengal per 1,000 of Strength. | | | | |
|---|---|---|---|---|
| Years. | Men. | Women. | Children. | |
| 1860 | 12·0 | 18.27 | 20·72 | |
| 1 | 23·73 | 27·91 | 30·53 | |
| 2 | 9·61 | 16·69 | 13·21 | |
| 3 | 4·09 | 7·57 | 3·75 | |

The intensity of attacks with reference to the ages will be seen by a Statement showing the relation of age to mortality from cholera, and from all other causes among British Soldiers in the Bengal Presidency during the five years 1863 to 1867. (Bengal Sanitary Commission Report p. 123-4.)

| | CHOLERA. | | | | FROM ALL OTHER CAUSES. | | | |
|---|---|---|---|---|---|---|---|---|
| Years. | Under 20 | 20-4 | 25-9 | 30 and upwards. | under 20.. | 20-24 | 25-29 | 30 and upwards. |
| 1863 | 1·49 | 4·91 | 3·68 | 2·50 | 5·98 | 13·95 | 24·46 | 26·16 |
| 1864 | 3·97 | 1·82 | 2·71 | 2·21 | 9·92 | 9·51 | 20·78 | 27·54 |
| 1865 | 2·07 | 1·98 | 3·59 | 3·54 | 6·20 | 10·35 | 21·15 | 34·78 |
| 1866 | 0·00 | 1·00 | 1·39 | 1·28 | 4·80 | 10·78 | 16·60 | 26·03 |
| 1867 | 12·81 | 15·82 | 11·65 | 12·99 | 3·90 | 10·63 | 14·19 | 26·25 |
| Average of deaths from cholera during the five years. | 4·06 | 5·10 | 4·60 | 4·50 | 6·16 | 11·04 | 19·43 | 28·15 |

With increasing years, the rate of deaths from all other diseases steadily increases, but cholera seems to strike down all ages at almost the same rate.

The other remarkable point, however, is noticed in running the eye up the two columns of the following table, where it will be readily observed how little variation occurs, one year with another, in the proportion of cases that recover. In twenty-seven out of the 48 years of the Madras European returns the proportion was one death in every two, three, or four cases admitted; and, in forty out of the 48 years, amongst the native soldiers, the proportion has been one death in every 2·0 to 2·9 cases admitted. In the whole period the Europeans lost one case in every 3·5, and the natives one in every 2·5. Though it is evident that the proportion of the European soldiers who now recover from an attack is less than in former years:—

*Return shewing the average strength, the Total Admissions and Total Deaths from Cholera, among the European and Native Soldiers of the Madras Army from* 1818 *to* 1868.

## TABLE XIII.

| EUROPEAN SOLDIERS. | | | | | | NATIVE SOLDIERS. | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Years. | Authority. | Average Strength. | Total admissions from Cholera | Total deaths from Cholera | Proportion of deaths to admissions. | Years. | Authority. | Average Strength. | Total admissions from Cholera | Total deaths from Cholera | Proportion of deaths to admissions. |
| 1817 | Madras Medical Board Records. | Returns Incomplete. | | | | 1817 | Madras Medical Board Records. | Returns Incomplete. | | | |
| 1818 | | 10,033 | 1,645 | Deaths not exhibited in the returns under the head of Cholera. | | 1818 | | 50,784 | 3,038 | Deaths not exhibited in the Returns under the head of Cholera. | |
| 1819 | | 8,929 | 930 | | | 1819 | | 73,634 | 3,651 | | |
| 1820 | | 9,903 | 356 | | | 1820 | | 81,644 | 3,332 | | |
| 1821 | | 10,708 | 450 | 36 | 1 in 12·50 | 1821 | | 81,468 | 2,962 | 841 | 1 in 3·52 |
| 1822 | | 11,197 | 957 | 174 | 1 in 5·50 | 1822 | | 74,707 | 559 | 199 | 1 in 2·80 |
| 1823 | | 11,262 | 323 | 60 | 1 in 6·40 | 1823 | | 71,378 | 945 | 348 | 1 in 2·71 |
| 1824 | | 9,757 | 727 | 188 | 1 in 3·86 | 1824 | | 68,435 | 1,675 | 546 | 1 in 3·07 |
| 1825 | | 10,188 | 433 | 172 | 1 in 2·51 | 1825 | | 74,922 | 1,930 | 717 | 1 in 2·69 |
| 1826 | | 10,423 | 311 | 76 | 1 in 4·09 | 1826 | | 82,562 | 938 | 294 | 1 in 3·18 |
| 1827 | Madras Printed Reports of 1844. | 11,680 | 270 | 110 | 1 in 2·4 | 1827 | | 84,128 | 560 | 283 | 1 in 1·98 |
| 1828 | | 12,503 | 434 | 117 | 1 in 3·7 | 1828 | | 76,224 | 819 | 368 | 1 in 2·22 |
| 1829 | | 11,640 | 239 | 35 | 1 in 6·82 | 1829 | Dr. Lorimer's Report on Cholera 1821 to 1844. | 71,945 | 501 | 213 | 1 in 2·35 |
| 1830 | | 11,623 | 290 | 45 | 1 in 6·44 | 1830 | | 67,106 | 264 | 126 | 1 in 2·09 |
| 1831 | | 10,863 | 289 | 91 | 1 in 3·17 | 1831 | | 61,623 | 640 | 271 | 1 in 2·36 |
| 1832 | | 10,580 | 528 | 223 | 1 in 2·36 | 1832 | | 60,678 | 808 | 333 | 1 in 2·42 |
| 1833 | | 9,863 | 966 | 233 | 1 in 4·14 | 1833 | | 60,099 | 1,228 | 579 | 1 in 2·12 |
| 1834 | | 9,321 | 130 | 14 | 1 in 9·28 | 1834 | | 58,854 | 115 | 58 | 1 in 1·98 |
| 1835 | Madras Medical Board Records. | 9,484 | 60 | 2 | 1 in 30·00 | 1835 | | 56,777 | 12 | 2 | 1 in 6·00 |
| 1836 | | 10,201 | 36 | 3 | 1 in 12·00 | 1836 | | 56,844 | 63 | 27 | 1 in 2·33 |
| 1837 | | 10,068 | 173 | 72 | 1 in 2·40 | 1837 | | 57,274 | 702 | 351 | 1 in 2·00 |
| 1838 | | 9,798 | 122 | 52 | 1 in 2·34 | 1838 | | 58,320 | 1,187 | 502 | 1 in 2·36 |
| 1839 | | 10,330 | 207 | 112 | 1 in 1·84 | 1839 | | 66,514 | 530 | 249 | 1 in 2·12 |
| 1840 | | 10,200 | 127 | 50 | 1 in 2·54 | 1840 | | 71,188 | 272 | 122 | 1 in 2·22 |
| 1841 | | 11,220 | 44 | 17 | 1 in 2.58 | 1841 | | 72,234 | 561 | 241 | 1 in 2·32 |
| 1842 | | 12,080 | 335 | 163 | 1 in 2·66 | 1842 | | 74,618 | 1,771 | 741 | 1 in 2·39 |
| 1843 | | 12,436 | 443 | 206 | 1 in 2·15 | 1843 | | 73,763 | 2,139 | 905 | 1 in 2·35 |
| 1844 | | 13,057 | 111 | 54 | 1 in 2·05 | 1844 | | 73,577 | 1,166 | 521 | 1 in 2·23 |
| 1845 | | 12,548 | 232 | 124 | 1 in 1·87 | 1845 | | 74,861 | 1,718 | 708 | 1 in 2·42 |
| 1846 | Inspector General Macpherson in<br>Page 658 Vol. ii Commission. | 11,113 | 146 | 75 | 1 in 1.98 | 1846 | | 74,682 | 2,699 | 1,208 | 1 in 2·23 |
| 1847 | | 11,429 | 32 | 22 | 1 in 1·4 | 1847 | Madras Medical Board Records. | 67,950 | 234 | 78 | 1 in 3·0 |
| 1848 | | 9,679 | 3 | 2 | 1 in 1·5 | 1848 | | 55,946 | 237 | 93 | 1 in 2·51 |
| 1849 | | 9,559 | 43 | 26 | 1 in 1·6 | 1849 | | 50,030 | 269 | 104 | 1 in 2·5 |
| 1850-1 | | 9,136 | 35 | 21 | 1 in 1·6 | 1850-1 | | 50,448 | 484 | 183 | 1 in 2·09 |
| 1851-2 | | 9,119 | 25 | 15 | 1 in 1·6 | 1851-2 | | 49,881 | 461 | 202 | 1 in 2·2 |
| 1852-3 | | 9,170 | 253 | 155 | 1 in 1·6 | 1852-3 | | 49,747 | 353 | 125 | 1 in 2·6 |
| 1853-4 | | 8,291 | 121 | 61 | 1 in 1·9 | 1853-4 | | 47,887 | 652 | 284 | 1 in 2·2 |
| 1854-5 | | 9,021 | 131 | 65 | 1 in 2·0 | 1854-5 | | 46,988 | 461 | 190 | 1 in 2·4 |
| 1855-6 | | 7,599 | 25 | 11 | 1 in 2·2 | 1855-6 | | 47,938 | 154 | 59 | 1 in 2·6 |
| 1856-7 | | 7,513 | 136 | 58 | 1 in 2·3 | 1856-7 | | 47,968 | 314 | 141 | 1 in 2·2 |
| 1857-8 | | 9,396 | 245 | 112 | 1 in 2·18 | 1857-8 | | 47,902 | 432 | 177 | 1 in 2·4 |
| 1858-9 | | 15,482 | 85 | 47 | 1 in 1·8 | 1858-9 | | 57,653 | 451 | 227 | 1 in 1·98 |
| 1859-60 | Inspector General's Office. | 16,921 | 216 | 99 | 1 in 2·1 | 1859-60 | Inspector General's Office. | 60,750 | 691 | 260 | 1 in 2·6 |
| 1860-1 | | 13,037 | 107 | 42 | 1 in 2·5 | 1860 | | 43,458 | 362 | 150 | 1 in 2·4 |
| 1861 | | 14,164 | 77 | 37 | 1 in 2·08 | 1861 | | 37,975 | 163 | 64 | 1 in 2·5 |
| 1862 | | 13,096 | 80 | 41 | 1 in 1·9 | 1862 | | 32,069 | 197 | 84 | 1 in 2·3 |
| 1863 | | 12,333 | 80 | 39 | 1 in 2·05 | 1863 | | 30,505 | 230 | 84 | 1 in 2·7 |
| 1864 | | 12,792 | 98 | 33 | 1 in 2·9 | 1864 | | 28,116 | 291 | 112 | 1 in 2·5 |
| 1865 | | 12,675 | 76 | 38 | 1 in 2·0 | 1865 | | 24,608 | 278 | 133 | 1 in 2·09 |
| 1866 | | 11,179 | 45 | 28 | 1 in 1·6 | 1866 | | 27,217 | 204 | 95 | 1 in 2·1 |
| 1867 | | 10,793 | 12 | 4 | 1 in 3·0 | 1867 | | 29,650 | 43 | 22 | 1 in 1·95 |
| 1868 | | 9,934 | 7 | 5 | 1 in 1·4 | 1868 | | 28,163 | 40 | 18 | 1 in 2·2 |
| | Total... | 791,163 | 12,331 | 3,429 | 1 in 3·5 | Total. | | 2,973,682 | 35,131 | 13,697 | 1 in 2·5 |

If any change has occurred since 1817 in the intensity of this disease, amongst the Native soldiers of the Madras Army, it has been increasing ; the proportion that recover, now, being somewhat smaller than formerly : and we must either suppose (1st) that science has made no progress in the discovery of curative measures ; or (2nd) that the agent that induces cholera is becoming more concentrated or less generally distributed ; or (3rd) that the soldiers are less exposed to its action, and only those are now being attacked who are unusually susceptible of it, a class amongst whom, as was already, remarked many fatal cases occur.

Value of Medical Treatment in Cholera.

With reference to the first of these hypotheses, it may be remarked, that the efficiency of medical treatment can be proved by comparing the mortality amongst patients who have applied early for assistance, with that amongst men who allowed the disease to remain a longer time on them before seeking relief ;—377 cases of cholera occurred in the 5th, 6th and 19th Regiments M. N. I.* in the year 1846, and the period of their application for medical relief at their regimental hospitals was as follows :

TABLE XIV.

| | The total duration of the disease, before coming to hospital, was | The average duration of the disease, before coming to hospital, was | | |
|---|---|---|---|---|
| | hours. | hours. | min. | sec. |
| Of the 377 patients.. . ............. ....... | 1,899¾ | 5 | 2 | 4 |
| Of the 176 cases, or 46 per cent that proved fatal.......... ................... .... | 1,001¼ | 5 | 41 | 20 |
| Of the 201 patients, or 53 per cent. that recovered.............................. .... | 898½ | 4 | 28 | 12 |

It appears from the previous table that those patients who recovered applied for medical treatment, on the average, nearly an hour and a half earlier than the men who died, and all who know how rapid the progress of this disease is, and how little can be done for it in its more advanced stages, will acknowledge the advantage that even this short interval gave.

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* The 5th Regiment was stationed at Bellary, the 19th Regiment at Cuddapah, and the— Regiment was marching from Madras to Bellary.

With a disease that proves fatal or otherwise in twelve or fifteen hours the difference of an hour and a half is a great matter.

The efficacy of treatment and of early treatment is perhaps better demonstrated by contrasting the rate of mortality among the patients who delayed longer than the average time in coming to hospital with that which occurred among the men who sought assistance earlier.

Of the 377 cases above alluded to

| | |
|---|---|
| 175 patients delayed longer than the average time of whom... ...... ......... ...... | 101 died and 74 recovered or...57·7 per cent died. |
| 48 patients came at the average time of whom | 25 died and 23 recovered or...52·0 per cent died. |
| 154 patients came sooner than the average time of whom | 50 died and 104 recovered or...32·4 per cent died. |

Of the patients who delayed longer than the average time more than the half died, but only a third part died of those who received treatment early; the proportions having been 1 death in every 1·7 admissions; 1 death in every 1·9 admissions; and 1 in every 3 admissions as the patients delayed longer, came at, or came sooner than, the average time, respectively.

In connection with this, it may be mentioned that recently, Dr. John Murray, Inspector General of Hospitals of the Bengal Medical Department, sent to the Medical Officers in India 90 questions relating to Cholera and from 481 of the officers he received replies, concurring in or dissenting from the propositions involved in the questions or regarding the subject as still unascertained.

Of those ninety questions, thirty were directed to obtain a knowledge of the prevailing belief as to the communicability of the disease and as to the importance of sanitary and precautionary measures, and sixty of the questions related to treatment.

The aggregate number of replies as to its communicability amounted to 2886, of which 2481, or 85·9 per cent. asserted its communicability; 11·2 per cent. were uncertain, and 2·8 per cent. have denied its communicability. At present, therefore, the Medical Officers in India, who believe in the communicability of this ailment, greatly preponderate. To the direct question, is it communicable? 456 replied in the affirmative, 20 were uncertain and 5 answered in the negative, and the following statement[1] will show that personal communication, the atmosphere, water, locality and the evacuations, are all regarded as media of its propogation:

| | Yes. | No. | Uncertain. |
|---|---|---|---|
| 2. Communicable.................... | 456 | 5 | 20 |
| 3. From person.. ... ....... ........ ... | 363 | 33 | 85 |
| 4. ,, place...... ....... .......... .. | 415 | 15 | 51 |
| 5. By atmosphere ............ .. | 391 | 12 | 78 |
| 6. By water......... ...... ... ... | 414 | 11 | 56 |
| 7. Through evacuations .... ... | 442 | 5 | 34 |
| Total.. | 2481 | 81 | 324 |

Eight questions were directed with a view to ascertain the expediency of sanitary measures generally, the necessity for pure air, and pure water, the importance of avoiding over-crowding, the danger from cholera evacuations, the injury from public latrines and the value of trees as impediments to the dissemination of the disease. The replies affirm the need for pure air and water, the avoidance of over-crowding and the danger from cholera evacuations. But amongst the 481 officers who replied, many have doubts as to injury resulting from the mixture with water of saline or vegetable or animal matters, a considerable proportion are uncertain as to any injury resulting from public latrines, and a large majority doubt whether trees offer any impediment to the dissemination of the disease. These points are well illustrated by the following abstract statement :

| | Yes. | No, | Uncertain. | | Yes | No. | Uncertain. |
|---|---|---|---|---|---|---|---|
| 8 Necessaries... ...... ... | | | | 12 Addition to water dangerous... ... ...... | | | |
| 1 Pure air............ | 473 | 3 | 7 | 1 Salts.......... ...... | 312 | 23 | 146 |
| 2 Free Ventilation... | 475 | 0 | 6 | 2 Vegetable Matter... | 346 | 9 | 126 |
| 3 Raised buildings.... | 444 | 4 | 33 | 3 Animal matter ... | 356 | 11 | 114 |
| | 1392 | 7 | 46 | 14 Public latrines spread the disease... ... ... ... | 341 | 9 | 131 |
| 19Malaria injurious, ... | 412 | 20 | 49 | 15 Trees impede dissemination....... ...... | 188 | 39 | 254 |
| 10 Crowding dangerous | | | | | | | |
| 1 in buildings ... ... ... | 472 | 1 | 8 | | | | |
| 2 at fairs...... ...... ... | 476 | 0 | 5 | | | | |
| 11 Water. | | | | | | | |
| 1 Pure water necessary. | 469 | .. | 12 | | | | |
| 2 Boiling useful... ... | 421 | 6 | 54 | | | | |
| 13 Admixture of choleraic-evacuations cause cholera........ ... ... | 427 | 4 | 50 | | | | |

Fifteen of Dr. Murray's questions inquire as to possible precautionary measures. Several of these relate to precautions which individuals may exercise, being of personal application, and they consist of avoidance of fatigue, exhaustion, over-eating, unripe or tainted food and of purgatives, and on the value of these points the members of the Medical profession in India are almost unanimous : indeed, except as to the danger from purgatives the concurrence is marked ; yet, as regards the South of India, there is no doubt that saline purgatives cannot safely be administered in cholera seasons.

| | Yes. | No. | Uncertain. |
|---|---|---|---|
| 16 Avoid Exhaustion... ... | 474 | 0 | 7 |
| „ Fatigue........ ...... | 479 | 0 | 2 |
| 17 Have diet moderate... | 464 | 0 | 17 |
| 18 Avoid unripe fruit ...... | 476 | 0 | 5 |
| „ Tainted food.. ...... | 478 | 0 | 3 |
| 20 Purgatives dangerous... | 434 | 9 | 38 |

The other suggested precautionary measures have a public character ; several of them relating to the importance of early medical care are concurred in by the bulk of the Medical Officers who have sent answers to the questions.

| | Yes. | No. | Uncertain. |
|---|---|---|---|
| 19 Remedy existing diseases, especially diarrhœa.................................... | 478 | 0 | 3 |
| 30 Early treatment most important.... | 470 | 1 | 10 |
| 29. 1 Distribution of medicines.......... | 449 | 9 | 23 |
| 3 House-to-House visitation......... | 450 | 8 | 23 |

But, in connection with the use of medicinal substances, as means of curing incipient disease and of warding off an attack of cholera, Dr. Murray asked whether quinine, chiretta or bitter tonics are considered of value as prophylactics. Some Regimental Medical Officers have been largely using quinine as a prophylactic, but none of the three drugs indicated by Dr. Murray have as yet found favour generally, for though 725 who have replied recognise their utility, 718 are uncertain or disbelieve in them.

| | Yes. | No. | Uncertain. |
|---|---|---|---|
| 21 Useful as prophylactics. | | | |
| Quinine........ ........ ... | 258 | 44 | 179 |
| Chiretta.. ....................... | 231 | 52 | 198 |
| Bitter tonics...... ... ......... | 236 | 45 | 200 |
| Total...... | 725 | 141 | 577 |

From the answers received to several questions relating to the possibility of protecting the public health, — by avoiding sick people, the articles they used, and localities, in which the disease exists, the importance of keeping aloof from the sick and from the articles and people they have come in contact with, and the value of disinfectants are strongly affirmed. It may be doubted whether any practical scheme for burning the evacuations could be devised. Even to collect them, amongst the people of the South of India, who sleep on the ground, may be said to be impossible, and to bury their excreta very difficult.

| | Yes | No. | Uncer-tain. |
|---|---|---|---|
| 16. 1 Avoid dissemination ........ | 470 | 0 | 11 |
| 25. 1 Isolate the infected ...... | 467 | 2 | 12 |
| 2 Isolate special Hospitals ... | 465 | 3 | 13 |
| 3 Isolate the attendants ..... | 458 | 7 | 16 |
| 26. 1 Remove from the locality .. | 472 | 3 | 6 |
| 2 Remove into tents ............ | 462 | 5 | 14 |
| 3 Remove across a river .... | 450 | 5 | 26 |
| 27. 1 Exclude affected persons.... | 463 | 3 | 15 |
| 2 ,, Clothes ................. | 461 | 3 | 17 |
| 3 ,, Vehicles .. ............ ... | 461 | 3 | 17 |
| 24. 1 Disinfect utensils ......... | 472 | 3 | 6 |
| 2 Burn clothing ............... | 469 | 2 | 10 |
| 3 Disinfect buildings........ ... | 475 | 0 | 6 |
| 29. 2 Funeral and Marriage parties in India dangerous .. .... | 428 | 12 | 41 |
| 22. Prevent spreading by evacuations. | 468 | 1 | 12 |
| 23. Evacuations to be buried .. .. | 391 | 17 | 73 |
| Do do burned | 404 | 15 | 62 |

It may be that the difficulty of carrying out any order either to burn or to bury the evacuations, may account for the many replies dissenting from or uncertain as to the practical value of any such recommendations.

It will be observed, above, how unanimously the Medical Officers in India commend the disinfecting of utensils, of clothing and of buildings, it will therefore be well to ascertain what materials are considered the most useful, and the preponderance is in favour of carbolic acid.

| | Yes | No. | Uncer-tain. |
|---|---|---|---|
| 28. Disinfectants preferred : | | | |
| 4 Iron.............................. | 245 | 8 | 228 |
| 6 Zinc.............................. | 268 | 7 | 206 |
| 5 Charcoal.......................... | 285 | 9 | 187 |
| 7 Lime.............................. | 290 | 18 | 173 |
| 1 Sulphur........................... | 337 | 7 | 137 |
| 2 Chlorine.......................... | 376 | 7 | 98 |
| 3 Carbolic acid ..................... | 412 | 1 | 68 |

Dr. Murray in his report on Cholera, makes a numerical examination of the question of treatment. He has not, however, done so by exhibiting the results of certain modes of treatment applied to certain numbers of sick. The data necessary for such a form of investigation can never be available, because no medical man will feel justified in rigidly prescribing any certain series of drugs, regardless alike of the varying forms which every disease assumes and of the peculiar features which every case presents, as modified by the age, the sex, the race and the constitution of the patient under his care.

Dr. Murray has done nearly all that is possible in such an inquiry. He sent out to all medical men in India sixty-nine leading questions which he classed under five headings, viz. (D) General indications of treatment ; (E) Treatment during the first stage or Malaise ; (F) of the 2nd stage or Diarrhœa ; (G) of the 3rd stage or Collapse; and (H) of the 4th stage or Re-action, and to each of his questions he received 481 replies.

These replies are arranged below under four heads, and it will be observed that a great majority of the medical men have affirmed his views as to the general indications of treatment: certain remedies, regarding the utility of which he inquired, have been declared by very large majorities to be valuable : his questions as to other drugs have only small numbers reporting favourably of them, and others are distinctly pronounced against or are even declared dangerous. These points will be observed in the following Abstract Statement:

| *D. General Indications of treatment.* | Yes. | No. | Uncertain. |
|---|---|---|---|
| 31, Remove the poison from the system .... | 389 | 16 | 76 |
| 32, Support the organs affected and general strength........... .. | 459 | 2 | 20 |
| 33, Restore the secretions of the.... ... ... | | | |
| 1 Liver ...... | 448 | 5 | 28 |
| 2 Kidneys ... | 453 | 4 | 24 |
| 3 Lungs......... | 446 | 5 | 30 |
| 4 Skin... .... | 446 | 4 | 31 |
| 34, Remove.... ....... | .. | .. | ... |
| 1 Effete constituents retained in the system..... | 399 | 11 | 71 |
| 2 Impurities in the blood... ........ | 399 | 8 | 64 |
| 35, Guard against.... | .. | ... | .. |
| 1 Checking reaction ........ | 467 | 2 | 12 |
| 2 Violent reaction, by avoiding strong stimulants during collapse...... .. | 461 | 4 | 16 |
| 36, Remove local complications... ...... | 468 | 1 | 12 |
| 37, Different stages require different treatment............... | 471 | 1 | 9 |
| 38, Primary action of the poison paralysis of the sympathetic nerves....... .. .. | 238 | 11 | 242 |
| *E. Treatment during 1st stage or Malaise.* | | | |
| 39, Eliminate the poison through...... | | | |
| 1 Liver....... | 373 | 17 | 91 |
| 2 Kidneys .. | 373 | 16 | 92 |
| 3 Skin ...... | 364 | 24 | 93 |
| 4 Lungs.. ... | 350 | 18 | 113 |
| 40, No specific is known | 465 | 4 | 12 |
| *F. Treatment 2nd Stage, Diarrhœa.* | | | |
| 48, General Indications. | | | |
| 1 Check Diarrhœa. | 458 | 6 | 17 |
| 2 Promote secretions.. ... | 459 | 6 | 16 |
| *G. Treatment 3rd Stage, Collapse,* | | | |
| 66, 1st Relieve urgent symptoms......... ... | 467 | 4 | 10 |
| 2 No active remedies | 421 | 26 | 34 |
| 80, Fatigue and erect position dangerous | 474 | 3 | 4 |
| *H. Treatment of the 4th Stage, Reaction.* | | | |
| 88, A stage of Cholera which generally takes place......... ...... | 410 | 13 | 58 |
| 89, Relieve prominent symptoms... ..... | 479 | 1 | 1 |

*Remedies declared of value by large majorities.*

| *E. Treatment in the 1st Stage or Malaise.* | Yes, | No. | Uncertain. |
|---|---|---|---|
| 41, Spices and Carminatives useful ... | 411 | 13 | 57 |
| 42, Wines and Spirits useful ... | 413 | 9 | 59 |
| 43, Calomel valuable when light stools or scanty urine ... | 352 | 18 | 111 |
| 44, Quinine and Tonics useful ... | 321 | 30 | 130 |
| 461, Change of air useful. | 450 | 1 | 30 |
| 47, Warm Clothing and flannel belts useful ... | 462 | 2 | 17 |
| *F. 2nd Stage, Diarrhœa.* | | | |
| 49, Opiates ... | 335 | 46 | 100 |
| 50, Chlorodyne ... | 354 | 26 | 101 |
| 531, Astringents ... | 375 | 27 | 79 |
| 2 Chalk mixture ... | 323 | 39 | 119 |
| 54, Spices and Carminatives ... | 399 | 21 | 61 |
| 55, Opium and Carminatives .. | 333 | 35 | 113 |
| 56, Cholera pills ... | 341 | 27 | 113 |
| 60, Sinapisms ... | 466 | 2 | 13 |
| 63, Hot Bottles ... | 373 | 24 | 84 |
| *G. 3rd Stage, Collapse.* | | | |
| 67, Thirst. ... | | | |
| 1 Iced water ... | 459 | 5 | 17 |
| 2 Solid ice in mouth. | 453 | 6 | 22 |
| 3 Cold water with ammonia or soda | 381 | 17 | 83 |
| 4 Effervescing draugths ... | 430 | 12 | 39 |
| 5 Acid draughts ... | 364 | 32 | 85 |
| 68, Vomiting ... | | | |
| 1 Sinapisms ... | 439 | 11 | 31 |
| 70, Cramps | | | |
| 2 Frictions ... | 435 | 11 | 35 |
| 71, Weak action of the heart | | | |
| 3 Brandy ... | 305 | 50 | 126 |
| 72, Sinking in Epigastrium | | | |
| 2 Camphor .. | 343 | 22 | 116 |
| 3 Ammonia ... | 374 | 11 | 96 |
| 81, Heat | | | |
| 1 Hot bottles .. | 469 | 5 | 7 |
| 2 Hot bricks .. | 467 | 7 | [illegible] |
| 82, Keep up spirits ... | 469 | 6 | 6 |
| 87, Nourishment | | | |
| 1 Soups ... | 451 | 11 | 19 |
| 2 Liebegs ... | 426 | 15 | 40 |
| 3 Nourishing enemata | 431 | 12 | 38 |
| *H. Treatment of the 4th Stage, Reaction.* | | | |
| 90, Encourage sleep. avoid fatigue and erect posture ... | 477 | 1 | 3 |
| 1 Brandy ... | 384 | 25 | 72 |
| 2 Opium ... | 397 | 21 | 63 |
| 93, Suppression of urine | | | |
| 1 Turpentine ... | 315 | 45 | 121 |
| 3 Dry Cupping ... | 372 | 17 | 92 |
| 4 Chlorate of Potash... | 301 | 21 | 159 |
| 5 Hot Bath ... | 304 | 33 | 144 |
| 94, Deficiency of Bile | | | |
| 1 Calomel ... | 359 | 40 | 82 |
| 95, Purging | | | |
| 1 Anodynes ... | 350 | 39 | 92 |
| 96, Vomiting ... | | | |
| 1 Effervescing draughts ... | 463 | 2 | 16 |
| 2 Nourishing enemata ... | 450 | 6 | [illegible] |
| 97, Nourishing food ... | 478 | ... | |
| 98, Change of air in Convalescence .. | 471 | 1 | [illegible] |
| 99, One attack does not prevent another.. | 449 | 4 | [illegible] |

*Remedies on which only smaller numbers have reported favourably.*

| *F. 2nd Stage, or Diarrhœa.* | Yes. | No. | Uncertain. |
|---|---|---|---|
| 57, Calomel valuable... | 292. | 49 | 140 |
| 58, 1 Sulphuric acid... | 280 | 32 | 169 |
| 2 Vinegar ... | 104 | 66 | 311 |
| 59, 1 Acetate of Lead... | 182 | 68 | 231 |
| 2 Gallic acid ... | 125 | 53 | 303 |
| 61, Hot Saline Enemata | 166 | 47 | 268 |
| 63, Warm Baths .. | 179 | 101 | 201 |
| 2 Wet Sheets .. | 153 | 124 | 204 |
| *G. 3rd Stage or Collapse.* | | | |
| 68, Vomiting. | | | |
| 2 Blisters .. | 220 | 101 | 160 |
| 3 Ice to Spine .. | 211 | 69 | 201 |
| 4 Large doses of Calomel ... | 173 | 116 | 192 |
| 5 Mustard emetics | 166 | 123 | 192 |
| 7 Hydrocyanic Acid | 239 | 74 | 168 |
| 8 Chloroform ... | 260 | 62 | 159 |
| 9 Creosote .. | 186 | 71 | 224 |
| 69, Congee Stools. | | | |
| 1 Hot Saline enemata give relief. ... | 264 | 42 | 175 |
| 70, Cramps. | | | |
| 1 Hot Saline enemata .. | 199 | 53 | 229 |
| 3 Chlorodyne .. | 208 | 76 | 197 |
| 72, Sinking in Epigastrium. | | | |
| 1 Chillies ... | 265 | 59 | 157 |
| 76, Chloroform dangerous ... | 272 | 51 | 158 |
| *H. Treatment 4th, Stage, Reaction.* | | | |
| 91, Quinine ... | 234 | 37 | 210 |
| 93, Suppression of Urine | | | |
| 2 Blisters, Sinapisms. | 252 | 74 | 155 |
| 6 Tinct. Cantharidis | 247 | 76 | 158 |
| 94, Deficiency of bile | | | |
| 2 Spices ... | 2 11 | 87 | 183 |
| 95 Purging | | | |
| 2 Calomel .. | 240 | 76 | 165 |
| 3 Ipecacuanha ... | 259 | 55 | 167 |

*Remedies pronounced against—even declared dangerous*

| *E. 1st. Stage or Malaise.* | Yes. | No. | Uncertain. |
|---|---|---|---|
| 45, Purgatives dangerous. ... | 421 | 7 | 53 |
| 46, 2 Exposure and fatigue. | 468 | 1 | 12 |
| F. *2nd. Stage* or *Diarrhœa.* | | | |
| 51, Brandy partly useful... | 409 | 23 | 49 |
| 52, Brandy and Opium apt to induce dangerous reaction ... | 354 | 31 | 96 |
| 62, Bleeding | | | |
| 1st. Stage ... | 13 | 391 | 77 |
| 2nd. Stage........ | 12 | 393 | 76 |
| 3rd. Stage...... | 23 | 385 | 73 |
| 4th. Stage........ | 11 | 390 | 80 |
| 63, 4 Cold effusion.... | 89 | 155 | 237 |
| 64, 1 Purgatives dangerous .. | 365 | 37 | 79 |
| 2 Castor oil .... | 227 | 106 | 148 |
| 3 Hot saline enemata. .... | 174 | 76 | 231 |
| 65, Fatigue dangerous... | 471 | 2 | 8 |
| G. *3rd Stage,* or *Collapse.* | | | |
| 68, Vomiting | | | |
| 6 Tartar emetic ... | 91 | [illegible] | [illegible] |
| 69, With congee stools, | | | |
| 2 Opium & Chloroform dangerous... | 327 | 41 | 113 |
| 70-4, Strychnine........ | 94 | 113 | 274 |
| 71, Weak action of Heart | | | |
| 1 Saline transfusion | 101 | 91 | 289 |
| 2 Enemata ... | 180 | 60 | 241 |
| 73, Quinine useful ... | 116 | 111 | 254 |
| 74, Peculiar Remedies. | | | |
| 1 Belladonna .. | 51 | 108 | 322 |
| 2 Chlorate of Potash | 121 | 87 | 273 |
| 3 Strychnine .. | 63 | 100 | 318 |
| 4 Electricity .. | 87 | 81 | 313 |
| 5 Musk. ... | 89 | 78 | 314 |
| 6 Acid Hallieri..... | 109 | 74 | 298 |
| 75, Opium injurious.. | 422 | 12 | 47 |
| 77, 1 Brandy dangerous | 173 | 155 | 153 |
| 2 Wine dangerous.. | 150 | 176 | 155 |
| 78, Powerful remedies to be avoided ... | 413 | 21 | 47 |
| 79, Antiseptics........ | | | |
| 1 Carbolic acid.. ... | 50 | 66 | 365 |
| 2 Sulphites..... ... | 97 | 69 | 315 |
| 3 Vinegar...... ... | 63 | 66 | 352 |
| 83, Hypodermic injection. | 91 | 74 | 316 |
| 84, Calomel | | | |
| 1 Frequently given in large doses. ... | 104 | 165 | 212 |
| 2 Small doses ... | 135 | 140 | 200 |
| 85, Tartar Emetic, Sulphate Magnesia | 17 | 385 | 79 |
| 86, Water. | | | |
| 1 Cold effusion ... | 45 | 267 | 169 |
| 2 With hot Blankets | 121 | 180 | 189 |
| *H. Treatment 4th Stage, Reaction.* | | | |
| 92, Act as poisons at the commencement of reaction | | | |
| 1 Brandy ... | 384 | 25 | 72 |
| 2 Opium ... | 397 | 21 | 63 |
| 94, Deficiency of bile. | | | |
| 3 Opium. ... | 153 | 149 | 179 |

It will be seen from the above that the medical practitioners in India have formed very decided opinions as to certain lines of treatment and as to the values of certain remedial measures, and it is probable that a further series of questions would secure even more decided replies.

Is the cholera Agent becoming more concentrated, or are the European soldiers less exposed to its influence?

Considering that we are still unacquainted with the cause of this disease, it seems useless to enter into the discussion of the second question; and in asking whether the agent that induces cholera be now less abundant than formerly or the soldiers be less exposed to its action, it may be remarked that in the 48 years from 1821 to 1868 inclusive, the strength of the Madras Army and the admissions and deaths from cholera were as follow:—

## TABLE XV.

### CHOLERA.

| Period 48 years 1821 to 1868. | European Soldiers. | | | Native Soldiers. | | |
|---|---|---|---|---|---|---|
| | Aggregate Strength. | Total Admissions. | Total Deaths. | Aggregate Strength. | Total Admissions. | Total Deaths. |
| In the first 13 years viz. from 1821 to 1833...... | 142,277 | 6217 | 1550 | 935,275 | 13,829 | 5117 |
| In the second 13 years viz. from 1834 to 1846.... | 141,856 | 2166 | 944 | 869,506 | 12,935 | 5635 |
| In the 11 years from 1847 to 1857-8......... | 99,912 | 1049 | 548 | 562,685 | 4051 | 1636 |
| In the 11 years from 1858-9 to 1868....... | 142,406 | 883 | 413 | 400,154 | 2950 | 1249 |
| Total..... | 526,451 | 10315 | 3455 | 2767,620 | 33,765 | 13,637 |

The ratio per 1,000 of the strength admitted, and the proportion of deaths to admissions in these four periods have been as follow :

## TABLE XVI.

### Cholera

| Period 48 years, 1821 to 1868. | European Soldiers. |  | Native Soldiers. |  |
|---|---|---|---|---|
|  | Ratio per 1000 of mean strength admitted. | Proportion of deaths to admissions. | Ratio per 1000 of mean strength admitted. | Proportion of deaths to admissions. |
| In the first 13 years viz. from 1821 to 1833. | 43·6 | 1 death in 4·01 admissions. | 14·7 | 1 death in 2·7 admissions. |
| In the second 13 years viz. from 1834 to 1846. | 15·2 | 1 death in 2·2 admissions. | 14·8 | 1 death in 2·2 admissions. |
| In the 11 years, from 1847to 1857-8. | 10·4 | 1 death in 1·9 admissions. | 7·1 | 1 death in every 2·4. |
| In the 11 years, from 1858-9 to 1868. | 6·2 | 1 death in every 2·1 admissions. | 7·3 | 1 death in every 2·3. |
| Average of 48 years 1821 to 1868. | 19·5 | 1 death in 2·98 | 12·2 | 1 death in 2·47 |

It will be observed that the number of the native soldiers who have been attacked scarcely varied in the first two periods, the annual admissions having been 14·7 per 1,000 in the thirteen years from 1821 to 1833, and 14·8 per 1,000 in the thirteen years from 1834 to 1846 ; the proportion of deaths to admissions, also, was almost the same, having been one death in every 2·7 admissions in the first of those periods and one death in every 2·2 in the second period.

In the subsequent twenty-two years, however, there was a great diminution in the numbers of Native Soldiers attacked, the rate per 1,000 falling from 14·7 to 7·2.

A very great change has likewise taken place in the proportion of the European soldiers attacked with it ; for in the 13 years from 1821 to 1833, 43· per 1,000 of the strength were annually admitted, only 15· per 1,000 in the second thirteen years 1834-1846 ; only 10·4 per 1,000 in the next eleven years, and only 6·2 in the eleven years ending 1868.

## ARE CHOLERA ATTACKS MORE INTENSE ?

There is an impression abroad that the Cholera patients who recover are fewer now than formerly; but that popular belief is not supported as regards the Madras Army by the records of half a century: and, with an aggregate strength in that time of 772,298 Europeans, and 2,767,620 natives; and a mortality in that time from this sole ailment of 3,429 Europeans and 13,697 natives, accurate averages may be struck.

| Years. | Of the attacked there died amongst the | |
|---|---|---|
| | Europeans one in every | Natives one in every |
| 1821 to 1833 | 4·01 | 2 7 |
| 1834 to 1846 | 2·2 | 2·2 |
| 1847 to 1857-8 | 1·90 | 2·4 |
| 1858-9 to 1868 | 2·1 | 2·3 |
| Total period of 48 years. | 2·98 | 2·47 |

To what cause, then, are we to attribute the decreasing numbers of attacks, alike amongst the European and the Natives Soldiers of the Madras Army? there have in the time under review been improvements in the pay, diet, dress, and dwellings of both arms of the service, and the conservancy in and near their barracks and lines, has been more closely attended to; but the most marked change in the Madras Presidency has been the less frequent marches of regiments and the increased facilities and comforts which steam-vessels, rail-roads and horse and bullock transit-carriage have afforded when moving. Its prevalence is still great amongst the Civil population in every part of the Madras Presidency, and in some Collectorates the mortality from it amounts, in some years, to one-third or one-half of all the deaths.

| 48 years. | Ratio per 1,000 Admitted of strength. | |
|---|---|---|
| | Europeans. | Natives. |
| 1821 to 1833 | 43·6 | 14·7 |
| 1834 to 1846 | 15·2 | 14·8 |
| 1847 to 1857-8 | 10·4 | 7·1 |
| 1858-9 to 1868 | 6·2 | 7·3 |

The agent causing this disease is as virulent and, perhaps, is as abundant as ever; but the European and native soldiery of Madras may be less exposed to it.

The records of the Bengal European Army present several remarkable features in the occurrence and intensity of this disease and that they may be fully understood, it seems advisable to give here a tabular

Statement Showing the Admissions and deaths from Cholera among EUROPEAN troops in the Bengal Presidency from 1818 to 1867 from pages 103-4, Bengal Sanitary Commissioner's Report for 1867.

| Period. | Strength. | Admitted. | Deaths. | Ratio per 100 |  | Of the Admissions one died in every |
|---|---|---|---|---|---|---|
|  |  |  |  | Admitted. | Died. |  |
| 1818 to 1822 | 47,017 | 1,018 | 272 | 21·6 | 5·7 | 3·7 |
| 1823 to 1827 | 54,168 | 2,005 | 625 | 37·0 | 11·5 | 3·3 |
| 1828 to 1832 | 62,800 | 2,495 | 544 | 39·7 | 8·6 | 4·5 |
| 1833 to 1837 | 57,549 | 1,561 | 420 | 27·1 | 7·2 | 3·7 |
| 1838 to 1842 | 68,238 | 2,406 | 855 | 35·2 | 12 5 | 2·8 |
| 1843 to 1846-47 | 87,086 | 2,599 | 1,177 | 29·8 | 13·5 | 2·2 |
| 1847 to 1848 | 18,228 | 262 | 89 | 14·3 | 4·8 | 2·9 |
| 1848 to 1849 | 16,235 | 377 | 110 | 23·3 | 6·7 | 3·4 |
| 1849 to 1850 | 18,524 | 507 | 234 | 27·3 | 12·6 | 2·1 |
| 1850 to 1851 | 21,063 | 23 | 8 | 1·09 | 0·3 | 2·8 |
| 1851 to 1852 | 20,710 | 168 | 61 | 8·1 | 2·9 | 2·7 |
| 1852 to 1853 | 20,865 | 708 | 260 | 33·9 | 12·4 | 2·7 |
| 1853 to 1854 | 21,505 | 423 | 258 | 19·6 | 11·9 | 1·6 |
| 1854 to 1855 | 20,046 | 92 | 47 | 4·6 | 2·35 | 1·9 |
| 1855 to 1856 | 19 885 | 100 | 55 | 5·5 | 2·77 | 1·8 |
| 1856 to 1857 | 21,304 | 1,313 | 704 | 61·6 | 33·05 | 1·8 |
| 1858 | 43,771 | 738 | 401 | 16·8 | 9·16 | 1·8 |
| 1859 | 55,104 | 924 | 478 | 16·8 | 8·67 | 1·9 |
| 1860 | 48,901 | 1,106 | 589 | 22·6 | 12·04 | 1 8 |
| 1861 | 44,879 | 1,663 | 1,065 | 37·1 | 23·73 | 1·5 |
| 1862 | 42,980 | 674 | 413 | 15·7 | 9·61 | 1·6 |
| 1863 | 41,351 | 225 | 169 | 5·5 | 4·09 | 1·3 |
| 1864 | 40,385 | 148 | 103 | 3·7 | 2·55 | 1·4 |
| 1865 | 37 210 | 160 | 116 | 4·3 | 3·12 | 1·3 |
| 1866 | 35,013 | 80 | 48 | 2·3 | 1·37 | 1·6 |
| 1867 | 34,603 | 722 | 479 | 20·9 | 13·84 | 1·5 |
| 49 years. | 999,420 | 22,495 | 9,580 | 22·5 | 9·58 | 2·3 |

In the 49 years of the above record, there died from this disease 9,580 European soldiers, out of an average strength of 20,396. Reckoning the present strength of a Regiment at 800, Cholera has carried off the strength of a regiment once in every four years. In each of the years 1858, 1859, 1862, and 1867, upwards of four hundred died: in the year 1860, the deaths were 589; in 1856-7 there were 704 deaths, or 33 per 1000 of the strength, and in 1861, the great number of 1,065, or 23·73 per 1000 of the strength. An enemy such as this may well occupy intellects of a high order.

The Bengal record fully bears out the prevailing opinion that fewer than formerly of those attacked, recover from this disease. In four successive periods, in the 49 years, of the attacked, there died one in every 3·82 ;—2·67 ;—2·17 and 1·66. In the same periods, however, fewer of the soldiers have been attacked as we approach the present, time, the rate per 1000 admitted having been successively, 33·5 ;—30·8 ;—20·1 and 15·1 in the four large portions of the 49 years. These points will be observed in the following abstract of the above statment :

EUROPEAN SOLDIERS.

| Period. 49 years 1818 to 1867. | Aggregate Strength. | Cholera. | | Ratio per 1000 of mean Strength. | | Of the attacked there died one in every |
|---|---|---|---|---|---|---|
| | | Admitted | Died. | Admitted. | Died | |
| 15 years 1818 to 1832 | 163, 985 | 5518 | 1441 | 33·5 | 8·7 | 3·82 |
| 14 ? ,, 1833 to 1846-7 | 212, 873 | 6566 | 2452 | 30·8 | 11·5 | 2·67 |
| 10 ,, 1847-8 to 1857 | 198, 365 | 3973 | 1826 | 20·01 | 9·2 | 2·17 |
| 10 ,, 1858 to 1867 | 424, 197 | 6440 | 3861 | 15·1 | 9·1 | 1·66 |
| Total...... | 999, 420 | 22497 | 9580 | 22·5 | 9·58 | 2·34 |

The intensity of Cholera varied but little wherever it appeared.

Another interesting fact connected with this disease is that up to late years, its intensity continued almost the same as after its re-appearance, in 1817, and varied but little in whatever country and under whatever circumstances it appeared. Amongst large bodies of troops, comfort and ease, or labour and privations had exercised considerable influence on the liability to be attacked and on the extent of the out-break, but when once it had broken out the proportion of deaths to admissions has not, in the Madras Presidency, greatly varied. Thus the native soldiers of the Madras Army when at ease in cantonments have had a smaller proportion of their strength attacked than when marching from station to station, but the proportion of deaths to sick have been the same in either case ; so whether it has appeared amongst them in a sporadic or epidemic form, or whether regiments were attacked when marching through villages already affected with it, or in districts where no cholera prevailed, there was much difference in the proportion of the strength attacked, but little or none as to the proportion of deaths to admissions. This will be observed from the following table extracted from Dr. Lorimer's cholera report :—

## TABLE XVII.

Showing the Aggregate Strength and the total admissions and total deaths from Cholera amongst the Native Soldiers of the Madras Army in the 24 years from 1821 to 1844.

| | | Aggregate strength. | Total admissions by Cholera. | Total deaths by Cholera. | Ratio per 1,000 of meanstrength | | Proportion of deaths to admissions. | Authority. Report on Cholera |
|---|---|---|---|---|---|---|---|---|
| | | | | | Admitted. | Died. | | |
| When living in cantonments..... | | 1, 608, 830 | 13, 686 | 5, 261 | 8·5 | 3·2 | 1 in every 2·6 | page 36 |
| When marching................ | | 413, 946 | 8, 661 | 3, 575 | 20·9 | 8·6 | 1 in every 2·4 | 36 |
| 83 times | Attacking Troops on the march in an epidemic form when prevalent in the villages through which the troops were marching............... | 62, 758 | 7, 357 | 3, 016 | 117· | 48·0 | 1 in every 2·4 | 8 & 9 |
| 5 times | Attacking Troops on the march in a sporadic form when prevalent in the villages.............. | 894 | 13 | 5 | 14·5 | 5·5 | 1 in every 2·6 | 8 & 9 |
| 28 times | Attacking Troops on the march epidemically when not prevalent in the villages................ | 20, 748 | 1, 367 | 550 | 6·5 | 26·5 | 1 in every 2·4 | 8 & 9 |
| 23 times | Attacking Troops on the march sporadically when not prevalent in the villages. | 14, 160 | 110 | 43 | 7·7 | 3·0 | 1 in every 2 5 | 8 & 9 |
| 10 times | Attacking Troops on the march (other circumstances not detained) epidemically. | 9, 245 | 652 | 267 | 70·5 | 28·8 | 1 in every 2 4 | 8 & 9 |
| 3 times | Attacking Troops on the march (other circumstances not detailed) sporadically. | 1, 515 | 21 | 9 | 13·8 | 5·9 | 1 in every 2·3 | 8 & 9 |

It will be observed that the liability to be attacked differed greatly according to circumstances, but once ill, there was little or no difference in the number of recoveries. But, as was remarked, this unchanging intensity is not peculiar to the countries in which the Madras native soldiers are employed, though they occupy 370,000 square miles of territory, for returns demonstrate that it has but slightly varied amongst the British soldiers, who have been attacked with it in countries wide apart, a fact which is well shown by the following table :—

TABLE XVIII.

| | COUNTRY AND FORCE. | YEARS OR PERIOD. | No. of admissions | No. of deaths. | Proportion of deaths to admissions. |
|---|---|---|---|---|---|
| a | Moulmein. H. M, Regiments | for 11 years, from 1829 to 1840 exclusive of 1834 | 4 | 1 | 1 in 4· |
| b | Berhampoor. European Soldiers | for 10 years, for 1823 and from 1826 to 1834 | 642 | 169 | 1 in 3·79 |
| b | Chinsura. European Soldiers, | for 8 years, from June 1826 to June 1827 and 1830 to 1836 | 235 | 64 | 1 in 3·67 |
| b | Calcutta, European Soldiers, | for 10 years, from 1827 to 1838 | 240 | 75 | 1 in 3·20 |
| a | Masulipatam, H. E. I. Co's Artillery, | for 2½ years, from 1st March 1832 to 31st August 1833 and M. E. Regiments from 1st July 1826 to 30th June 1832. | 113 | 32 | 1 in 3·53 |
| a | Fort Saint George, Madrās, H. M. Regiments and H. E. I. Co's Artillery | for 10 years, from 1829 to 1838 | 392 | 136 | 1 in 2·8 |
| a | Saint Thomas' Mount, H. E. I Co's H. A. and Foot Artillery | for 9 years, from 1829 to 1838 exclusive of 1831<br>for 10 years, from 1829 to 1838 | 36 | 8 | 1 in 4·5 |
| a | Nagpore. H. E I Co's European Regiment<br>H. E. I Co's European Horse Artillery<br>H. E. I Co's European Foot Artillery | for 10 years, from 1829 to 1839 exclusive of 1831<br>for 10 years, from 1829 to 1839<br>for 10 years, from 1829 to 1838 | 155 | 40 | 1 in 3·8 |
| a | Jaulnah H E. I. Co's European Horse Artillery | for 11 years, from 1829 to 1841 exclusive of 1831 and 1835 | 17 | 7 | 1 in 2·4 |
| a | Secunderabad H. M. Regiments<br>H E. I Co's Foot Artillery | for 10 years, from 1829 to 1839 exclusive of 1833<br>for 12 years, from 1829 to 1840 | 81 | 31 | 1 in 2·6 |
| c | Bellary H. E. I Co's Foot Artilery | for 13 years, from 1827 to 1839 | 44 | 16 | 1 in 2·8 |
| | H. M. Regiments | for 22 years from 1818 to 1839 | 869 | 276 | 1 in 3·1 |
| a | Bangalore, H. M Hussars | for 9 years, from 1830 to 1838; H. M. Infautry for 8 years 1831 to 1838, H. E. I. Co's Horse Artillery for 11 years from 1829 to 1842; Foot Artillery for 12 years from 1830 to 1841 | 292 | 79 | 1 in 3·6 |
| a | Trichinopoly, H. M. Regiments | for 9 years viz., 1829. 1831. 1833 to 1837 and 1839: and H E. I Co's Foot Artillery from 1832 to 1841 | 53 | 29 | 1 in 1·8 |
| a | Cannanore H M. Regiments and H. E I. Co's Artillery | for 10 years, from 1829 to 1838 | 76 | 13 | 1 in 5·4 |
| d | Ceylon, H. M. Regiments | for 15 years, from 1818 to 1832 | 788 | 257 | 1 in 3·0 |
| d | Great Britain, Dragoon Guards and Dragoons | for 3 years, 1832 1833 and 1834 | 171 | 54 | 1 in 3·05 |
| d | Gibraltar, H. M. Regiments | for 1 year, 1834 | 459 | 131 | 1 in 3·48 |
| d | Nova Scotia and New Brunswick, H. M. Regiments | for 1 year, 1834 | 210 | 59 | 1 in 3·5 |
| d | Canada H. M. Regiments | for 2 years, 1832 and 1834 | 356 | 127 | 1 in 2·80 |
| e | American Army, American Soldiers | for 4 years, from 1832, 1834 and 1835 | 686 | 191 | 1 in 3·59 |

a Report on the Madras Army. b Johnston and Martin on Tropical Climates. c Madras Journal. d Colonel Tulloch's Statistical Reports on the British Army. e Dr. Forry's Reports.

It will be noticed from the preceding table that although cholera in its westerly progress took fifteen years to reach Britain and the continent of America, the proportion among the British soldiers of the Madras Army from 1821 to 1846 was one death in every 3·3 admissions; in Great Britain from 1832 to 1834 it was 1 death in every 3·05 admissions;—and in the same years from 1832 to 1835, according to Dr. Forry, the American soldiers lost 1 in every 3·5 admissions.

Since the year 1818, the British troops serving in Ceylon have suffered on seven occasions from cholera and the following statement will determine if any material change has occurred in the intensity of the disease in that Island:

TABLE XIX.

| YEARS: | 1818 | 1819 | 1820 | 1821 | 1825 | 1829 | 1832 | Total. |
|---|---|---|---|---|---|---|---|---|
| Number of admissions from Cholera.................... | 4 | 236 | 42 | 3 | 111 | 48 | 344 | 788 |
| Number of deaths from Cholera.......................... | 2 | 89 | 12 | 2 | 31 | 14 | 107 | 257 |
| Proportion of deaths to admissions, 1 in every ........... | 2 | 2·6 | 3·5 | 1·5 | 3·6 | 3·4 | 3·2 | 3·0 |

Influence of Age on recovery.

In bodies of men, such as the native regiments are composed of, the majority of the men in the ranks being from 25 to 29 years of age, it is difficult for an individual to obtain a sufficient number of cases to ascertain the mortality amongst patients at different periods of life. Of the 377 cases, however, already alluded to (at page 29) their total ages amounted to 10,559 years and their average age to 28·00 years; 201 of them recovered, whose total ages amounted to 5,406 years, their average age to 26·89 years and 176 of them died, whose total ages amounted to 5,153 years, and their average age to 29·27 years.

The average age of the fatal cases was greater than that of all the 377 patients by 1·27 years, and greater, by 2·38 years, than the average age of the men who recovered. It was comparatively upon the older soldiers, therefore, that the mortality fell.

The influence of age on mortality may also be ascertained by comparing the proportion of deaths among patients at different ages. Of these 377 cases, whose average age was 28.00 years, 141 of the patients were above the average age, of whom 78 died and 63 recovered, being 55.31 per cent. of deaths. 12 of the patients were at the average, of whom 3 died and 9 recovered, being 25.00 per cent. of deaths. 224 of the patients were below the average age, of whom 95 died and 129 recovered, being 42.41 of deaths.

The deaths among the older patients was 13 per cent. higher than among the younger men, the proportion of deaths to admissions being one death in every 1.8 admissions and one in every 2.3 respectively, showing, thereby, the greater powers of rallying (the stronger liability) in the younger soldiers.

When cholera broke out in Colombo in 1832 " the influence of length of residence in the Island as a means of protection against the disease has been thus demonstrated" (*Ceylon Report p.* 21.)

TABLE XX.

| | There were at that time in the Garrison. | Whereof attacked. | Whereof died. | Proportion of deaths to admissions. |
|---|---|---|---|---|
| " Of those who arrived in Ceylon with their Corps some years before........ | 926 | 186 | 35 | 1 in 5.3 |
| Of recruits subsequently arrived ...... | 147 | 41 | 4 | 1 in 10.2 |

" Of the former class one-fifth only were attacked but nearly 4 per cent died, of the latter one in 3½ were attacked but only 2¾ per cent died : being for the most part younger men it is probable superior vigour of constitution enabled a greater proportion of them to overcome the disease." —p. 21.

Influence of habits of life on recovery.

" The following calculations have also been made from the same source with the view of determining whether the liability to, or mortality from the disease was in any way influenced by the character of the individuals :

TABLE XXI.

| | There were at that time in the Garrison. | Whereof attacked. | Whereof died. | Proportion of deaths to admissions. |
|---|---|---|---|---|
| " Of regular, sober and well-conducted soldiers. | 853 | 172 | 27 | 1 death in 6.3 |
| Of drunken and irregular habits.................. | 220 | 55 | 12 | 1 death in 4.5 |

"Of the drunken and irregular a fourth part was attacked and from 5 to 6 per cent died, while of the sober and well-conducted only a fifth part was attacked, and from three to four per cent died, thus showing a marked exemption in favour of the latter."—*Ibid* p. 21.

Influence of Age, Sex, and rank of life on susceptibility and recovery.

The Reports on the Madras Army also supply some information which may assist in forming an opinion as to the liability to be attacked and the mortality amongst the sick of different ranks and ages. From these Reports, the following is extracted, showing the aggregate strength and the total admissions and deaths from cholera amongst the officers, men, women and children of H. M. Regiments in the Cantonments of Fort St. George, Bangalore, Trichinopoly, Cannanore, Bellary, Secunderabad, and Moulmein :

TABLE XXII.

| | Officers. | | | Men. | | | Women. | | | Children. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Total. | | | Total. | | | Total. | | | Total. | |
| | Aggregate Strength. | Admitted from Cholera. | Died from Cholera. | Aggregate Strength. | Admitted from Cholera. | Died from Cholera. | Aggregate Strength. | Admitted from Cholera. | Died from Cholera. | Aggregate Strength. | Admitted from Cholera. | Died from Cholera. |
| | 2319 | 21 | 9 | 54 3 49 | 762 | 257 | 6557 | 109 | 38 | 9877 | 109 | 53 |
| Proportion of admissions to strength 1 in every... ... ... | | | 110 | | | 71·. | | | 60. | | | 90. |
| Proportion of death to admissions 1 in every............ | | | 2.3 | | | 2.9 | | | 2.8 | | | 2.0 |

The officers have suffered the least from the attacks of this disease ; the children next ; and after them the men, and then the women ; but of the deaths in proportion to the admissions, first the children, then officers suffered most, and the men and women least.

The Report for 1867 of the Bengal Sanitary Commissioner furnishes similar information for that Presidency for that year, of which the following are abstracts. The information given is, however, for far too limited a period to admit of any reliable deductions being drawn, but may be useful for future inquirers:

Statement showing the Rate per 1,000 of admissions and deaths and the deaths to admissions in the officers, soldiers, women and children, of each body of European soldiers at Peshawar in 1867.

| Battery or Regiment | Ratio per 1,000. | |
|---|---|---|
| | of strength died. | of admissions died. |
| E. Bat. F. Brig. R. H. A.. ..... | 106·0 | 538·4 |
| F. ,, F. ,, ,, ,, ...... | 86·6 | 687·5 |
| E. ,, 19th Brig. R. A... ..... | 121·9 | 517·2 |
| 4 ,, 22nd ,, R. A........... | 86·2 | 833·3 |
| 42nd Highlanders .. ........... | 100·8 | 548·3 |
| 77th Regiment ........ ...... | 58·3 | 675·8 |
| Total........ | 82·6 | 601·3 |

Also, the following cases of cholera and choleraic-diarrhœa occurred at Meerut in the Royal Artillery in the 19th Hussars and 1st Battalion of the 3rd Buffs:—

| | Cholera. | | One death in every | Choleraic-Diarrhœa. | | One death in every |
|---|---|---|---|---|---|---|
| | Admitted | Died. | | Admitted. | Died. | |
| Officers .. | 1 | 1 | 1· | ... | ... | ... |
| Men .... | 111 | 107 | 1·03 | 12 | 4 | 3. |
| Women.... | 15 | 13 | 1·15 | 3 | ... | none in 3. |
| Children, . | 30 | 25 | 1·2 | 2 | ... | ,, ,, 2 |
| Total... | 157 | 146 | 1·07 | 17 | 4 | 1 in 4·2 |

For the Bengal European Army, in 1867, the following information is given as to the Cholera attacks: (p. 122.)

| Strength | | | Admitted per 1,000 of strength. | | | Died per 1,000 of strength. | | | Of the attacked there died one in every | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Men. | Women. | Children. | Men. | Women. | Children. | Men. | Women. | Children. | Men. | Women. | Children. |
| 22946 | 2162 | 3529 | 31·0 | 42·0 | 34·0 | 20·5 | 27·2 | 27·2 | 1·5 | 1·5 | 1·2 |

In 1861, during an epidemic in the Bengal Presidency, it was shewn that cholera was very severe when attacking patients in hospitals. In that year, the per-centage of cases to strength was 7·7 amongst the healthy men of the European Regiments : but, amongst the patients in hospitals attacked, it was 14·7 : and the deaths to strength, which were 5·1 among the healthy men were 11·6 among the sick in hospital. In that year, amongst the European troops many of the first cases occurred in the hospitals, and the hospitals were reported to be the source where the attacks in a large proportion of the healthy men had their origin. (*Report of Sanitary Commissioner of Government of India* 1865 p. 12).

Among the Native Troops composing the Bhootan Field Force, in 1865, the admissions from Cholera amounted to 37·6 per 1,000, but the ratio in the Native Army generally was only 5·7. In that year, the liability to be attacked and the relative severity of the attacks, in the two races were as per margin.—Compared with the Natives, fewer of the Europeans were admitted, but more of their sick died,—725 per 1,000 of the admissions of the European soldiers, but only 497 of the Native soldiers, having died.

| | Ratio per 1,000 of mean strength. | | Ratio per 1,000 of admissions died. |
|---|---|---|---|
| | Admitted | Died. | |
| Europeans. | 4·3 | 3·1 | 725 |
| Natives. | 5·7 | 2·8 | 497 |

## BENGAL PRESIDENCY : JAILS.

| Years. | Average strength. | From all causes, Ratio per 1000 of mean strength. | | From Cholera Ratio per 1,000. | |
|---|---|---|---|---|---|
| | | Admitted. | Died. | Admitted. | Died. |
| 1859 | 46,733 | 1336·3 | 827·7 | 18·4 | 8·58 |
| 1860 | 46,348 | 1491·8 | 1108·1 | 57·7 | 21·66 |
| 1861 | 50,915 | 1314·2 | 966·5 | 36·5 | 15·21 |
| 1862 | 52,871 | 1346·1 | 667·5 | 15·2 | 5·52 |
| 1863 | 52,401 | 1368·8 | 858·4 | 35·8 | 14·33 |
| 1864 | 52,598 | 1227·3 | 701·9 | 22·9 | 8·56 |
| 1865 | 54,337 | 1154·0 | 576·6 | 15·8 | 7·19 |
| 1866 | ... | ... | .. | 27·2 | 12·10 |
| 1867 | ... | ... | ... | 11·5 | 4·93 |

Statement showing the comparative prevalence and intensity of cholera among European and Native Soldiers and Native prisoners in the Bengal Presidency.

| Years. | Ratio per 1000 of mean strength of European Soldiers. | | Native Soldiers. | | Prisoners. | | Deaths per 1000 of Admissions. | | |
|---|---|---|---|---|---|---|---|---|---|
| | Admitted | Died. | Admitted | Died. | Admitted. | Died. | European Soldiers. | Native Soldiers. | Prisoners. |
| 1854-5 | 4·6 | 2·35 | .. | ... | ... | ... | 505·4 | ... | 392·9 |
| 1855-6 | 5·5 | 2·77 | ... | ... | ... | ... | 500·0 | ... | 475·0 |
| 1856-7 | 61·6 | 33·05 | ... | ... | ... | ... | 536·2 | ... | 459·5 |
| 1858 | 16·8 | 9·16 | ... | ... | ... | ... | 543·3 | .. | 411·8 |
| 1859 | 16·8 | 8·67 | ... | .. | 18·4 | 8·58 | 501·7 | 376·7 | 465·7 |
| 1860 | 22·6 | 12·04 | ... | ... | 57·7 | 21·66 | 532·5 | 463·3 | 375·5 |
| 1861 | 37·1 | 23·73 | 9·8 | 4·09 | 36·5 | 15·21 | 640·4 | 419·0 | 416·3 |
| 1862 | 15·7 | 9·61 | 5·0 | 2·51 | 15·2 | 5·52 | 612·8 | 502·8 | 363·6 |
| 1863 | 5·5 | 4·09 | 2·6 | 1·52 | 35·8 | 14·33 | 751·1 | 570·0 | 401·0 |
| 1864 | 3·7 | 2·55 | 3·8 | 1·67 | 22·9 | 8·56 | 695·9 | 439·7 | 373·1 |
| 1865 | 4·3 | 3·12 | 5·7 | 2·83 | 15·8 | 7·19 | 725·0 | 497·3 | 456·9 |
| 1866 | 2·3 | 1·37 | 4·7 | 2·54 | 27·2 | 12·10 | 600·0 | 546·0 | 443·3 |
| 1867 | 20·9 | 13·78 | 6·2 | 2·96 | 11·5 | 4·94 | 660·7 | 508·2 | 428·8 |

(Bengal Sanitary Commissioner's Report 1867 Pages 126, 128)

The influence of fatigue, exhaustion, and other physically depressing circumstances on the susceptibility and recovery.

It has been already pointed out (at page 40) that the native soldiers of the Madras Army have had a much larger proportion of their strength attacked when marching, than when living at ease in Cantonments; and the following table will show that the proportion of their strength attacked has increased with the length of their journey, with the number of days they were occupied on the journey, and the number of men congregated together :

What this proportion amounted to will be ascertained from the following tables, extracted from Dr. Lorimer's valuable report.

## TABLE XXIII.

1st. With reference to the distance marched ; vide Report p. 3.

| Distance of each march. | Under 200 miles | 200 to 400 miles | 400 to 600 miles | 600 to 800 miles | 800 to 1050 miles. | Total. |
|---|---|---|---|---|---|---|
| Number of marches in each distance ........... | 176 | 274 | 99 | 45 | 8 | 602 |
| Number of times attacked | 15 | 93 | 33 | 21 | 6 | 144 |
| Ratio of attacks to marches per cent............. | 8·5 | 33·9 | 33·3 | 46·6 | 75·0 | 23·9 |

2nd. With reference to the number of days on the march. p. 3.

| Number of days on the march. | Under 20 days. | 20 to 40 days. | 40 to 60 days. | 60 to 80 days. | 80 to 100 days. | 100 to 120 days. | 120 days & upwards. | Total. |
|---|---|---|---|---|---|---|---|---|
| Number of marches ........ ...... | 137 | 219 | 120 | 74 | 18 | 14 | 20 | 602 |
| Number of times attacked.......... | 11 | 39 | 39 | 30 | 8 | 7 | 10 | 144 |
| Ratio of attacks to marches per cent........... ........... .... | 8·0 | 17·7 | 20·2 | 4·05 | 44·4 | 50·0 | 50·0 | 23·9 |

3rd. With reference to the numbers congregated together. p. 38.

| Effective Strength. | 100 to 300 men. | 300 to 500 men. | 500 to 700 men. | 700 to 900 men. | 900 to 1100 men. | 1100 to 1534 men. | Total. |
|---|---|---|---|---|---|---|---|
| Number of times attacked.............. | 17 | 15 | 21 | 54 | 35 | 9 | 151 |
| Ratio per 1000 of the strength attacked... | 61·6 | 68·0 | 58·1 | 89·0 | 86·2 | 132·1 | 86·9 |

As a marked difference was observed to exist between the proportion of the strength attacked when in Cantonments and when marching, it was to be expected that whatever tended to exhaust the physical powers of the soldiers would be found to increase their liability to be attacked.

The proportion of regiments attacked has been smallest when the distance marched, the number of days the march occupied, and the assemblage of human beings have been least; and, as the length of the journey, the period occupied on it, and the numbers congregated together, have increased, the liability to have cholera breaking out increased likewise.

This information, derived from Dr. Lorimer's very valuable report on cholera, is fully borne out by the results he obtained from examining the returns from the smaller bodies of men moving on treasure detachments, but the above details are so satisfactory, it is not necessary to examine the occurrences among these smaller bodies.

In connection with these remarks on the influence exercised by the physical condition of the troops and their liability to be attacked when marching, it would appear that the different branches of the native army have been attacked in unequal proportions. In the 13 years from 1832 to 1844 the ratio of attacks to marches was 11·7 per cent. in the sappers and miners; from 1820 to 1844, it was 20·2 per cent. in the Cavalry, and 24·6 per cent. in the Infantry; and it was 50 per cent. in the Artillery from 1831 to 1844, " the Sappers and Miners having been the least liable to this disease, and the Artillery the most obnoxious to it. " *Ibid* p. 2.

The following tables obtained from the same source, (page 6) will point out the connection that exists between the out-breaks of cholera among the troops, when marching, and the state of the weather, and season of the year:

TABLE XXIV.

| Nature of the weather recorded on the march. | Cool and Dry. | Hot and Dry. | Cool and Rainy. | Hot and Rainy. | Variable. | Not given. | Total. |
|---|---|---|---|---|---|---|---|
| Number of marches made.......... | 228 | 136 | 89 | 53 | 19 | 77 | 602 |
| Number of out-breaks............ | 40 | 26 | 32 | 19 | 13 | 14 | 144 |
| Ratio of attacks to marches per cent .......................... | 17.5 | 19.1 | 35.9 | 35.8 | 68.4 | 18.1 | 293. |

Fewest out-breaks occurred in dry weather, whether the temperature was cool or hot. In rainy weather, the proportion of out-breaks was doubled, and most occurred when the weather was variable, the attacks, then, being quadruple the rate that occurred during dry weather. As connected with this, the season of the year seems, likewise, to influence the occurrence of this disease, p. 7, but this subject will be further examined, hereafter.

## TABLE XXV.

| Months. | August. | November. | December. | February. | October. | April. | March. | September. | July. | January. | June. | May. | Total. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Number of marches commenced in each month........................... | 21 | 44 | 79 | 84 | 49 | 49 | 73 | 32 | 13 | 98 | 22 | 38 | 602 |
| Number of Epidemic attacks....... | 2 | 5 | 11 | 15 | 9 | 9 | 14 | 7 | 3 | 23 | 6 | 14 | 118 |
| Number of Sporadic attacks........ | 0 | 2 | 4 | 0 | 4 | 3 | 2 | 2 | 1 | 5 | 1 | 2 | 26 |
| Ratio of Epidemic attacks to marches per Cent ................. | 9.5 | 11.3 | 13.9 | 17.8 | 18·3 | 18.3 | 19.1 | 21.8 | 23.0 | 23.4 | 27.2 | 36.8 | 19.6 |

The 26th question put by Dr. Murray was to ascertain the views of Medical Officers as to the advantages of removing from the invaded locality, either into tents or across a river, and the replies which he received show very few dissentients from the belief that these measures are valuable. But, Dr. Murray furnishes a statement showing the result in each instance of 80 removals of bodies of Europeans, of Native troops and of Native prisoners from Jails. Of 57 removals of European troops, in 26 instances cases of cholera occurred after the fifth day after removal : of 14 removals of Native troops, in 2 instances cases of the disease occurred after the fifth day, and, of 9 instances where the Native prisoners were removed from Jails, in five occasions cases of the ailment appeared after the fifth day. Of the total 80 removals, cases occurred after the fifth day in 33, or 41·2 of the removed.

| | Yes. | No. | Uncertain |
|---|---|---|---|
| 26 Removal from the locality | 472 | 3 | 6 |
| 2 Removal into tents.... ... | 462 | 5 | 14 |
| 3 ,, across a river ...., | 450 | 5 | 26 |

Table showing the admissions from Cholera during the Epidemic of 1867, after removal into Camp, amongst the European and Native Troops and Prisoners in the Presidency of Bengal.

| | Regiments and Detachments moved into Camp in consequence of Cholera. | RESULT IN EACH INSTANCE OF REMOVAL. | | | | | | Total number of removal. | REMARKS. |
|---|---|---|---|---|---|---|---|---|---|
| | | No FRESH CASE AFTER. | | | | | | | |
| | | Removal into Camp. | 1st Day. | 2nd Day. | 3rd Day. | 4th Day. | Cases occurred after 5th. | | |
| Europeans. | Troops from 12 Stations...... | 17 | 3 | 4 | 1 | 1 | 25 | 51 | Dr. Beatson's Report. |
| | Detachment, Ajmeer ... ... ... | 1 | ... | ... | ... | ... | ... | 1 | Ajmeer Report. |
| | H. M's 90th Regiment Subathoo...... ............... | 3 | 1 | ... | ... | ... | 1 | 5 | Dr. Munro's Report. |
| Natives | Native Troops and Detachments from 8 Stations...... | 10 | 2 | ... | ... | ... | 2 | 14 | Regimental Reports. |
| | Prisoners from 9 Jails......... | 3 | 1 | ... | ... | ... | 5 | 9 | Civil Surgeon's Report. |
| | Total... | 34 | 7 | 4 | 1 | 1 | 33 | 80 | |

In another tabular statement, Dr. Murray contrasts the sickness in the Bengal troops moved into a free cholera camp with that of those who remained in Cantonments during epidemic attacks in 1863 and 1867, and the results of the contrast may be thus shown :

| Stations. | Troops removed into Cholera-Camp or remained in Stations. | Strength. | Date of removal and return and remained in Cantonments. | Date of sickness subsequent. | Fevers. | | Other diseases. | | Total | | Average Ratio per annum to strength | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Ad. | Died. | Ad. | Died | Ad. | Died | Admitted. | Died. |
| Agra. | H. M 23rd Regiment ,, 5 Companies............ | 405 | Removed 31st July \| Returned 27th August | 4 Months from Sept to Dec. 1863. | ... | ... | ... | ... | 269 | 3 | 199·2 | 1·842 |
| | ,, 5 do ............ | 453 | | do | ... | ... | ... | ... | 459 | 2 | 303·9 | 13·23 |
| Umballa | ,, 94th Regiment .......... | 566 | Remained. | 5 Months June to October 1867... | 199 | 1 | 220 | 7 | 419 | 8 | 185·0 | 3·53 |
| | Royal Artillery... ...... ...... | 257 | 21st April \| 12th May | do | 114 | ... | 82 | ... | 196 | ... | 190·6 | ... |
| | H. M. 21st Hussars ........ | 439 | Remained | do | 76 | ... | 239 | 3 | 315 | 3 | 199·3 | 1·89 |
| Meean-Meer. | Royal Artillery ................ | 310 | do | 2 Months from Sept. to Oct, 1867. | 72 | ... | 48 | ... | 120 | ... | 232·2 | ........ |
| | H. M. 106th Regiment ... | 740 | May & June \| August | do | 617 | ... | 103 | 1 | 720 | 1 | 583·7 | 0·81 |
| | Fort Garrison of Lahore ..... | 144 | do \| do | do | 69 | ... | 31 | 1 | 100 | 1 | 416·6 | 4·16 |
| Meerut | Royal Artillery .................. | 546 | Remained | 3 Months Sept. to Nov. 1867...... | 58 | ... | 151 | 4 | 209 | 4 | 153·1 | 3·00 |
| | | | | | | | | | | | Cholera | omitted |
| | H. M. 3rd Buffs ............. | 611 | August \| September | do | 155 | 3 | 225 | 19 | 380 | 22 | 248·7 | 14·4 |
| | ,, 19th Hussars.......... | 371 | do \| do | do | 50 | ... | 123 | 1 | 173 | 1 | 186·5 | 1·0 |
| Nowshera | ,, 19th Regiment 2 Cos | 179 | Remained | 6 Months July to December 1867... | 77 | ... | 26 | ... | 103 | ... | 115·0 | ........ |
| | ,, do do 7 do | 605 | 20th June \| 27th June | do | 416 | 1 | 150 | 6 | 566 | 7 | 187·1 | 2·31 |
| Peshawur, European Troops | Royal Artillery ................ | 333 | Remained | 4 Months from July to Oct. 1867... | 246 | 1 | 149 | 7 | 395 | 8 | 346·8 | 7·20 |
| | H. M. 42nd Regiment...... | 583 | 21st May \| 30th June | do | 61 | ... | 212 | 18 | 273 | 18 | 140·5 | 9·26 |
| | ,, 77th do. | 488 | 20th May \| 1st July went to Chera | do | 562 | ... | 148 | 8 | 710 | 8 | 435·0 | 4·91 |
| Peshawur, Native Troops. | Detachments of 27th 28th and 45th Bengal Native Infantry | 700 | do \| 30th June | 8 Months from May to Dec 1867... | 1061 | 3 | 272 | 13 | 1333 | 16 | 285·6 | 3·42 |
| | Rest of the corps ... .... .... | 1615 | 20th May \| 30th June | do | 2858 | 5 | 617 | 14 | 3475 | 19 | 324·7 | 1·7 |
| | 3rd and 13th Bengal Cavalry Sappers and Miners...... | 1007 | Remained do | do | ... | ... | ... | ... | 2358 | 19 | 351·2 | 2·8 |

The rate of mortality amongst those who remained was on the average less than amongst those who were moved out, whether Europeans or Natives, and markedly less amongst Native troops, the European rate being 4·497 of the moved to 3·780 of the remained and the Native rate 3·427 of the moved to 2·297 of the remained.

This step of leaving a Cantonment has been prominently put forward as of great value, but the above data do not support the opinions of those who have recommended it. With European soldiers, prisoners and those of the Native soldiery of the Bengal army and Contingent levies, who leave their families in their native villages, it would be possible to make the move. But with many of the Bombay Native Regiments and with all the Madras Army it is impracticable, as every Madras soldier, on the average, has 3 followers in his house and to supply tents or provisions for such a number would be impossible. In the South of India, the move into tents of any body of men, on the appearance of cholera in their barracks, their huts or their jails, will be deemed by Medical Officers, as a doubtful step ; in that part of India the cholera agent is so generally diffused that the chance of avoiding it by a move is small. Even in the Bengal Presidency, where moving out into camp was once strongly advocated, there has been a large restriction made.

The Government of India, in September 1865, ordered the Sanitary Commissioner for Bengal to suggest such Sanitary measures as would likely prevent the spread of epidemic diseases within jails. These consisted in care over the healthy ; in preserving the purity of the drinking water ; boiling it ; in moving into camp ; disinfecting the walls and floors of the infected barracks and out-houses and grounds : the bedding and clothing of individuals ; segregation of the cholera sick and attendants ; disinfecting the dejecta ; and similar rules to these were issued in the 9th Report of the Medical Officer of the Privy Council. Subsequently, in the Bengal Presidency, troops in Cantonments attacked with cholera, were ordered to be moved into camp, and further efforts were ordered in G. O. C. C., of India of the 26th August 1867 No. 159 of 9th May 1868, but the following paragraph 481, greatly modified the injunction to move ; " All therefore that need be laid down as an invariable rule is that the particular body of men among whom cholera has appeared in an epidemic form must be removed from the Cantonments. If, for example, this body consist only of the inmates of some one building, the measure need only be applied to them; if some particular company or troop be attacked it will be similarly dealt with. A whole regiment or the whole of the troops at the station need only be sent into camp, when it is found that the measures already adopted have not stopped the progress of the disease, or there is reason to fear that they will be insufficient.

With the sanction of Government, His Excellency the Commander-in-Chief begged General Officers and the Chief Administrative Medical Officers to adopt in practice the principle contained in the foregoing paragraph and on no account during the hot and rainy seasons to vacate whole suits of barracks, because one or two or even more have been infected with cholera. It is necessary only to evacuate such buildings as have actually presented cases. During the hot and rainy seasons if other buildings are available, they should be used in preference to placing the men in camp. In short, at such seasons of the year the camp must be held to be the last resource. This is more especially necessary when the ground is either covered with water or when it is drying up in the months of August and September."

At pages 114 and 115 of the 1867 Report from the Sanitary Commissioner with the Government of India, are remarks on the value of moving out: twelve instances are given of movements into camp, in 1867, from Mean-Meer, Subathoo, Meerut, Seetapore, Bareilly, Morar, Gwalior and Allahabad, followed by an entire disappearance of the disease and also of eight other moves of troops from the same places and from Moradabad and Ferozepore, in which no fresh seizures occurred after the third day; but, in that year also, there were instances in which no movement was considered necessary, yet the disease did not spread, and in spite of removal into camp of the Royal Artillery, 42nd and 77th Regiments from Peshawur of the 106th from Mean-Meer; of the 1st Battalion of the 3rd at Meerut: of the 107th Regiment from Allahabad, and the 36th from Shahjehanpore, all of them suffered more or less severely. These remarks seem to be the details of the statement at page 53, from which however these details differ.

On the whole, the existing data on this point are too few to admit of reliable conclusions being arrived at; but, the present evidence in the matter of a move when cholera occurs in barracks is opposed to such a step.

In the years 1821 to 1844, of the 152 Madras Native Regiments attacked with cholera when marching, the numbers of the out-breaks are recorded on the margin. The Ceded Districts, as will be observed, have been the most perilous. Indeed, at one time, a regiment moving through that central tract of the Peninsula of India, which is composed of the Collectorates of Bellary, Cuddapah and Kurnool, was deemed particularly fortunate if it escaped an attack of this disease. Even individual travellers were averse to cross that middle part of the Peninsula, certain towns in which, Cuddapah, Ghooty, Kurnool, Bellary and others near, had an extreme ill-fame.

| DIVISION. | No. of out-breaks. |
|---|---|
| Presidency .. ... | 1 |
| Nagpore ... ... | 2 |
| Northern ... ... | 12 |
| Southern Mahratta Country | 12 |
| Mysore ... ... | 19 |
| Hyderabad Sub-Force ... | 24 |
| Southern ... ... | 24 |
| Centre ... .. | 26 |
| Ceded Districts... ... | 32 |
| Total... | 152 |

At page 603, Vol. ii of the Report by the Royal Commission, there is a Statement by Dr. George Pearse showing the mortality in Bellary. from cholera and from all diseases, for a period of 25 years. In that period, of the total deaths there, 38.82 per cent of Europeans and 50.39 per cent of Native Soldiers were cut off by cholera.

| Bellary years. | Europeans. | | Natives. | | Per centage of Cholera deaths to whole Mortality. | |
|---|---|---|---|---|---|---|
| | Total deaths. | Cholera deaths. | Total deaths. | Cholera deaths. | Europeans. | Natives. |
| 1829 to 1838 | 285 | 62 | 581 | 283 | 21·75 | 48.7 |
| 1842 to 1856-7 | 359 | 201 | 937 | 488 | 55·9 | 52,08 |
| Total... | 644 | 263 | 1518 | 771 | 38.82 | 50,39 |

At page 660 of the same volume is another Return furnished by Dr. D. Macpherson from which the marginal Abstract Statement has been drawn: and, from it will be observed the large numbers of deaths by cholera in the central districts of the Peninsula of India. In seventeen years, numbers equal to a third of a regiment of Europeans and to three regiments of native soldiers were swept away by this fatal disease, in three military divisions of the Madras Presidency.

| DIVISIONS. | EUROPEANS. | | | NATIVES. | | |
|---|---|---|---|---|---|---|
| | Total died. | Cholera. | Deaths from other diseases. | Total deaths. | Deaths from Cholera. | Deaths from other diseases |
| Southern Mahratta Country 5 years 1842 to 1846 ... | 52 | 12 | 40 | 892 | 468 | 424 |
| Hyderabad Subsidiary Force 17 years 1842 to 1858-9. ... | 846 | 56 | 790 | 1942 | 1028 | 914 |
| Ceded Districts 17 years 1842 to 1858-9 ... | 417 | 208 | 209 | 987 | 498 | 489 |
| Total ... | 1315 | 276 | 1039 | 3921 | 1994 | 1927 |

In the Peninsula of India, the neighbourhood and banks of rivers seem particularly dangerous. In 152 marches of Madras Native Soldiers in which cholera broke out, 106 out-breaks occurred within 15 miles of rivers (the average distance was 3⅛ miles): and, of those 106, 47 occurred on the banks. Of 10 out-breaks near the Pennar river in the Centre Division and Ceded Districts, 3 occurred on its banks. Of 5 out-breaks near the Cauvery river, 1 was on its banks. Of 9 near the Palaur river, 2 were on its banks; of 8 near the Tumbudra and its affluent the Toonga, 6 were on their banks: and of 7 near the Kistna 6 were on the banks. The delay on the banks of rivers and the labours in crossing them may render soldiers more lia-

| DIVISION. | Numbers of Out-breaks. | Number under 15 miles of a river. | Number on the banks of a river. |
|---|---|---|---|
| Presidency Division ... | 1 | ... | ... |
| Centre Division ... | 26 | 20 | 6 |
| Southern Division ... | 24 | 21 | 13 |
| Mysore Division ... | 19 | 14 | 3 |
| Ceded Districts ... | 32 | 22 | 9 |
| Northern Division ... | 12 | 6 | 4 |
| Hyderabad Subsidiary Force.. | 24 | 16 | 9 |
| Nagpore Force .... | 2 | 2 | 1 |
| Southern Mahratta Country.. | 12 | 5 | 2 |
| Total ... | 152 | 106 | 47 |

ble to be attacked with cholera but near rivers the contaminating agent seems to be more abundant. The water used from them may be polluted, or the cholera agent may seek the low, moist beds of rivers or the valleys in which they run, or, if it be a thing with life, moisture may be needed for its development.

There are only a few points remaining to be noticed from the sources of information available. The first, obtained from the Madras Reports, exhibits the intensity of the disease at two periods of the year.

In the ten years from 1829 to 1838 the admissions and deaths among the European and Native soldiers of the Madras army were as follows :

| | 1st six months of the years. | | | | | 2nd six months of the years. | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Total. | | Ratio per 1000 of mean strength | | Proportion of deaths to admissions | Total. | | Ratio per 1000 of mean strength. | | Proportion of deaths to admissions |
| | Admitted. | Died. | Admitted. | Died. | | Admitted. | Died. | Admitted. | Died. | |
| Europeans... | 1·757 | 396 | 16·9 | 3·8 | 1 in 4·4 | 1·076 | 374 | 10·4 | 3·6 | 1 in 2·8 |
| Natives...... | 3·255 | 1·438 | 5·7 | 2·5 | 1 in 2·2 | 2·091 | 975 | 3·6 | 1·7 | 1 in 2·1 |

It will have been noticed, previously, when examining the quarterly record from Dr. Nicholson's tables, that cholera occurred more at some quarters of the year than at others, and the preceding table affords further proofs of the influence of the seasons on the prevalence as well as on the intensity of this disease. More European soldiers were admitted in the first than in the second half of the year, the proportion of the strength admitted being 16.9 and 10·4 per 1,000, at these two seasons respectively; but as only one death took place in every 4.4 of the admissions in the first half of the year, while one in every 2·8 of the patients died in the second half, this greater intensity made the actual loss of lives nearly alike at both seasons, 3.8 per 1,000 of the strength having died in the first-half of the year and 3·6 per 1,000 in the second-half.

It is in the Bengal Presidency, apparently, that cholera has, at present, chiefly taken its seat, and the Records and Returns from that part of India afford the largest means of examining various questions connected with this disease. The Records of the Bombay European and Native Army and native prisoners are of less value but they may be here examined, to ascertain what they show as to the intensity of cholera among the various races.

Statement showing the Strength, also the Admissions and Deaths, from Cholera, which have occurred amongst the European and Native Troops, and Jails of the Bombay Presidency, from the years 1840-41, to 1867-68, (Received from the Office of the Inspector General of Hospitals I. M. D. Bombay, in letter dated 30th September 1869, from Surgeon Major Johnstone, Secretary to the Inspector General.)

| | EUROPEANS. | | | | | | NATIVES. | | | | | | JAILS. | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Strength. | Admissions. | Deaths. | Per centage of Deaths to strength. | Per centage of Deaths to admissions. | Proportion of Deaths to attacks. | Strength | Admissions | Deaths. | Per centage of Deaths to strength. | Per centage of Deaths to admissions. | Proportion of deaths to attacks. | Strength. | Admissions. | Deaths. | Per centage of Deaths to strength. | Per centage of Deaths to admissions. | Proportion of deaths to attacks. |
| 1840-41 | 6,393 | 121 | 41 | 0·6 | 33·8 | 1 in 2·9 | 33,437 | 259 | 113 | 0 3 | 43·6 | 1 in 2·2 | 5,466 | 159 | 61 | 1·1 | 38·4 | 1 in 2·6 |
| 1841-42 | 7,665 | 128 | 31 | 0·4 | 24·2 | 1 in 4·1 | 28,926 | 82 | 29 | 0·1 | 35.3 | 1 in 2·8 | 5,402 | 47 | 21 | 0·3 | 44·5 | 1 in 2·2 |
| 1842-43 | 7,670 | 1085 | 426 | 5·5 | 39·2 | 1 in 2·5 | 26,290 | 429 | 158 | 0·6 | 36·8 | 1 in 2·7 | 5,213 | 417 | 162 | 3·1 | 38·8 | 1 in 2·6 |
| 1843-44 | 8,449 | 140 | 61 | 0·7 | 43·5 | 1 in 2·2 | 33,099 | 275 | 99 | 0·2 | 36· | 1 in 2·7 | 5,438 | 138 | 55 | 1· | 32·6 | 1 in 2·5 |
| 1844-45 | 8,744 | 161 | 74 | 0 8 | 45·9 | 1 in 2·1 | 38,746 | 237 | 80 | 0·2 | 33·3 | 1 in 2·9 | 6,060 | 284 | 99 | 1·6 | 34·8 | 1 in 2·8 |
| 1845-46 | 8,594 | 234 | 83 | 0·9 | 35·4 | 1 in 2 8 | 36,886 | 434 | 190 | 0·5 | 43.7 | 1 in 2·2 | 6,655 | 411 | 202 | 3· | 49·1 | 1 in 2·0 |
| 1846-47 | 9,390 | 992 | 487 | 5.1 | 49 0 | 1 in 2·0 | 47,142 | 170 | 51 | 0·1 | 30· | 1 in 3 3 | 6,834 | 551 | 203 | 2·9 | 36·8 | 1 in 2·7 |
| 1847-48 | 9.598 | 26 | 1 | 0·01 | 3 8 | 1 in 26 | 44,435 | 100 | 31 | 0·06 | 31· | 1 in 3·2 | 5,509 | 8 | ... | ... | ... | ... |
| 1848-49 | 10,031 | 16 | 1 | 0·01 | 6·2 | 1 in 16 | 40,451 | 22 | 4 | 0·01 | 18·1 | 1 in 5·5 | 8,034 | 9 | 1 | 0·01 | 11·1 | 1 in 9 |
| 1840-50 | 0,329 | 153 | 78 | 0·8 | 50·9 | 1 in 1·9 | 36,735 | 144 | 69 | 0·1 | 48· | 1 in 2·0 | 6,589 | 295 | 54 | 0·8 | 18·3 | 1 in 6·4 |
| 1850-51 | 9,948 | 183 | 56 | 0·5 | 36·0 | 1 in 3·2 | 35,915 | 190 | 84 | 0·2 | 44·2 | 1 in 2 2 | 6,850 | 164 | 69 | 1· | 42·1 | 1 in 2·3 |
| 1851-52 | 9,711 | 92 | 54 | 0·5 | 58·7 | 1 in 1.7 | 33,700 | 152 | 56 | 0·1 | 36·8 | 1 in 2·7 | 6,647 | 270 | 85 | 1·3 | 31·5 | 1 in 3·1 |
| 1852-53 | 9,559 | 4 | 1 | 0·01 | 25·0 | 1 in 4· | 33,641 | 51 | 9 | 0 02 | 17·2 | 1 in 5·6 | 6,330 | 24 | 5 | 0·08 | 20·8 | 1 in 4·8 |
| 1853-54 | 8,298 | 43 | 22 | 0·02 | 51·1 | 1 in 1·9 | 33 529 | 206 | 78 | 0·2 | 37 8 | 1 in 2·6 | 5,426 | 48 | 19 | 0·3 | 39·6 | 1 in 2·5 |
| 1854-55 | 8,305 | 103 | 45 | 0·5 | 43·6 | 1 in 2·2 | 34,607 | 347 | 154 | 0·4 | 4·4 | 1 in 2·2 | 5,748 | 118 | 40 | 0·7 | 33·9 | 1 in 2·9 |
| 1855-56 | 8,973 | 16 | 5 | 0·05 | 31·2 | 1 in 3·2 | 34,470 | 59 | 19 | 0·05 | 32·2 | 1 in 3.1 | 6,296 | 36 | 18 | 0·03 | 50· | 1 in 2 |
| 1856-57 | 8,995 | 36 | 11 | 0·1 | 30·6 | 1 in 2·12 | 34,362 | 80 | 36 | 0·1 | 45· | 1 in 2·2 | 6,374 | 46 | 17 | 0·2 | 42·5 | 1 in 2·3 |
| 1857-58 | 16,737 | 365 | 150 | 0·9 | 41·1 | 1 in 2·4 | 39,714 | 97 | 38 | 0·1 | 39·2 | 1 in 2·5 | 6,308 | 90 | 33 | 0·5 | 36·6 | 1 in 2·7 |
| 1858-59 | 20,347 | 27 | 4 | 0·2 | 14·8 | 1 in 6 7 | 39,891 | 247 | 152 | 0·4 | 61·5 | 1 in 1·6 | 6,591 | 6 | 2 | 0·03 | 33·3 | 1 in 3· |
| 1859-60 | 21,297 | 317 | 169 | 0·7 | 53·3 | 1 in 1 8 | 39,921 | 275 | 112 | 0·3 | 40·7 | 1 in 2·4 | 6,037 | 129 | 53 | 0·8 | 41·1 | 1 in 2.4 |
| 1860-61 | 16,855 | 174 | 105 | 0·6 | 60·3 | 1 in 1 6 | 37.226 | 187 | 87 | 0·2 | 46·5 | 1 in 2·1 | 6,080 | 183 | 66 | 1·1 | 36·1 | 1 in 2 7 |
| 1861-62 | 13,846 | 68 | 38 | 0·2 | 55·9 | 1 in 1·7 | 31,411 | 180 | 94 | 0·3 | 52·2 | 1 in 1·9 | 5,623 | 198 | 97 | 1·7 | 49·1 | 1 in 2·0 |
| 1862.63 | 11,937 | 78 | 53 | 0·4 | 68· | 1 in 13 2 | 28,980 | 99 | 51 | 0·2 | 51·5 | 1 in 1·9 | 7,015 | 52 | 26 | 0·4 | 50· | 1 in 2 |
| 1863-64 | 12,585 | 14 | 7 | 0·6 | 50· | 1 in 2 | 26,986 | 118 | 63 | 0.2 | 53·4 | 1 in 1·8 | 7,557 | 63 | 27 | 0·4 | 42·8 | 1 in 2·3 |
| 1864-65 | 12,645 | 54 | 22 | 0·2 | 40·7 | 1 in 2·4 | 26,539 | 251 | 113 | 0·4 | 45· | 1 in 2·2 | 7,266 | 133 | 46 | 0·6 | 34 6 | 1 in 2·8 |
| 1865-66 | 11,661 | 282 | 188 | 1·6 | 66·6 | 1 in 1 3 | 26,412 | 280 | 129 | 0 4 | 46 1 | 1 in 2·1 | 7,663 | 176 | 59 | 0·8 | 33 5 | 1 in 2.9 |
| 1866-67 | 11,958 | 14 | 7 | 0·06 | 50.0 | 1 in 2 | 26,635 | 19 | 10 | 0·04 | 52·6 | 1 in 1·9 | 7,450 | 22 | 6 | 0 08 | 27·3 | 1 in 3.6 |
| 1867-68 | 10,657 | 73 | 58 | 0·5 | 79 4 | 1 in 1·2 | 26,525 | 9 | 2 | 0·01 | 22·2 | 1 in 4·6 | 7,423 | 6 | 2 | 0 03 | 33·3 | 1 in 3 |
| Total ... | 309,877 | 4999 | 2278 | 0·73 | 45·5 | 1 in 2·1 | 957,611 | 4899 | 2111 | 0·22 | 43·0 | 1 in 2·3 | 1,79,884 | 4077 | 1528 | 0·843 | 37·04 | 1 in 2·6 |

The above Statement furnishes the means of comparing the occurrence of cholera, amongst different races, of an aggregate of 1,447,372 persons, for 28 years, in the Bombay Presidency.

| In the 28 years 1840-1 to 1867-8 Ratio per 1000 of Strength. | SOLDIERS | | NATIVE. |
|---|---|---|---|
| | EUROPEANS | NATIVES | PRISONERS |
| | Aggregate Strength 309, 877. | Aggregate Strength 957, 611. | Aggregate Strength 179, 884. |
| Admitted ... | 16·1 | 5·04 | 22·6 |
| Died ... | 7·3 | 2·2 | 8·4 |
| Proportion of deaths to admissions : | 1 death in 2·1 | 1 death in 2·3 | 1 death in 2·6 |

The rate of mortality amongst those who have been attacked has varied but little, being one in every 2·1, one in every 2·3; and one in every 2·6 respectively amongst the European soldiers, Native soldiers and Native prisoners. But the rates per 1000 of strength admitted and died have very greatly varied amongst the two races, the European soldiers being the more susceptible to this disease: and with them, too, the intensity of the attacks was greater.

INTENSITY.—Dr. Bryden notices (p. p. 233,234) the intensity of the attacks of cholera, on the European soldiers of the Bengal Army, and gives, in the marginal table, the rates of death amongst them, during the 42 years 1827 to 1868. He quotes Dr. Macpherson, showing that while, in the epidemic of 1818-1821, the loss was 25·92 out of each 100 attacked with Cholera, it was about 41·00 per cent, in the sixteen years ending with 1854. Between 1827 and 1840, the loss was, in no year, over one-third,—the maximum, in the year 1837, being 33·42. But between 1841 and 1852, the minimum was 38-46, in 1841, and the maximum 48·67 in 1845. Since 1853, the ratio has never fallen below 50 per cent, and, in the past ten years two-thirds have died of all the European Soldiers in whom the collapse of

| Died per 1000 treated. | Died per 1000 treated. | Died per 1000 treated. |
|---|---|---|
| 1827...281·3 | 1840...312·5 | 1862...612·8 |
| 8...297·7 | 1...384·6 | 3...751·1 |
| 9...228 9 | 2...434·6 | 4...695·9 |
| 1830...261·3 | 3...397·7 | 5...725·0 |
| 1...235·0 | 4...448·1 | 6...600·0 |
| 2...211·2 | 5...486·7 | 7...608·7 |
| 3...319·6 | 1846 to 1852 407·4 | 8...655·2 |
| 4...323·1 | 1853...610·0 | |
| 5...260 4 | 4...505·4 | |
| 6...161·7 | 5...500·0 | |
| 7...334 2 | 6...578·5 | |
| 8...277 0 | 7 | |
| 9...185·0 | 8...543·4 | |
| | 9...501·7 | |
| | 1860...532·5 | |
| | 1861...640·4 | |

cholera has been manifested. The smaller number who now recover from this disease was shown in a former part of this work.

RACE.—Dr. Brydon at pages 221 to 223, contrasts, as under, the loss from cholera amongst European and Native Regiments at the same stations in the invading cholera epidemics of various years, between 1845 and 1867

| | Europeans. | Natives |
|---|---|---|
| Strength at date of the invasion.... .... ... | 63,409 | 93,648 |
| Number admitted........................ | 5656 | 895 |
| „ died........................... | 3404 | 385 |
| Proportion relation to Strength treated........ | 1 in 11 | 1 in 105 |
| „ „ „ „ died........ | 1 in 19 | 1 in 243 |
| Affected per 1000 of strength.................. | 89·20 | 9·56 |
| Died „ „ „ „ „ ... | 53·68 | 4·11 |
| Died out of each 1000 affected............... | 601·9 | 430·2 |

This, he considers proves what I showed in 1849, that when true epidemic malaria is abroad in Upper India, the European soldiers have always suffered more than Native soldiers. He thinks that though the care taken of the European soldier ensures him protection against contagious disease—such as typhus in all its forms, small-pox, erysipelas, or hospital infection, they are not as yet generally adapted to secure his exemption from air-conveyed miasmata. There is, he observes, no reason to doubt that the amount of the cholera miasm, present in the native portion of an affected cantonment, is as great as that diffused over the European portion ; but, he remarks, the grand fact is that the miasm present is powerless to affect the Native Regiments as bodies, and is weak, even in the worst epidemics, in relation to individuals unless these be of some race foreign to the plains of India. He discusses the possible causes of such disparity, between Europeans and Natives : he advocates trees and groves near Europeans, as a screen against advancing malaria ; he discusses the question whether the new barracks of Upper India will elevate the European soldier above the cholera miasm, which, in the monsoon is not a ground-seeking and insidious miasm ; and he infers that the depth of the stratum in which it is conveyed, will be found in some degree proportionate to its lateral extension. He states that it is during the night or early in the morning that men seem to be affected. He further states that cholera loves to abide in excavations, and in the lowest strata of air of any locality, and that elevated situations and good drainage are powerful in preventing the localization of cholera. He discusses the question whether the European custom of resorting to general latrines may be a cause of their greater cholera, compared with Natives, who are individualized. He points out that the native soldier in his hut is individualized while the European soldier in his barracks however large the space is massed. He remarks that no condition can be more favourable to the local spread of such a pestilence as cholera, among any population, than that which is furnished by a dead moist atmosphere. But, with all this, he attributes much to one race being more liable than another, and he gives the following statement to illustrate the loss of the different races in the epidemic area of 1861, at the 9 stations of Morar, Agra, Delhi, Meerut, Deyrah, Umballah, Ferozepore, Meean-Meer, and Umritsur in the year 1861. This disparity he attributes to race : Dr. Bryden further illustrates the race influence by contrasting, at page 231, the climatic diseases in the European and Native army, for the five years, 1864 to 1868, as under

| | Europeans Strength 11,898 | Goorkhas Strength 1447 | Hindustanees Strength 6172 |
|---|---|---|---|
| Died | 939 | 52 | 32 |
| Died per 1000 | 78.92 | 35·94 | 5·18 |

| | Europeans Av. St. 35590 | | | | Natives Av. St. 38,349 | | | |
|---|---|---|---|---|---|---|---|---|
| | Total | | Ratio per 1000 of Strength | | Total | | Ratio per 1000 of Strength | |
| | Ad. | died. | Ad. | died. | Ad. | died. | Ad. | Died. |
| Remittent & continued fevers..... .... | 22588 | ... | 127 | ... | 2811 | ... | 15 | ... |
| Heat Apoplexy | ... | 396 | ... | 2·23 | | 35 | ... | 0·18 |
| Hepatitis. ... | ... | 541 | ... | 3·04 | | 35 | ... | 0·18 |

but, in thus illustrating his remarks, as to race, he does not appear to have seen what I wrote in 1844 and 1849, on the Health of Soldiers and on cholera : and at page 213, when he states that " it is the British soldier in himself, or in his domestic relations that fixes the ratio of attack," he repeats the fact that one race is more susceptible to attacks of this ailment than another race.

The influence of seasons is, likewise, well shown by the following:

TABLE of Monthly admissions and deaths from Cholera, among the European Troops, in the Bengal Presidency, in the six years 1859 to 1864, with cases from the General Hospital, Calcutta with which Inspector General Murray has obligingly favored me from the Records in the Office of the Principal Inspector General I. M. D. Calcutta. Simla 15th May 1866.

| For six years, in the months, | Calcutta & Bengal proper. Latitude 22° to 25° Longitude 85° to 91° Strength 20424. | | Benares. Latitude 25° to 27° Longitude 83° to 85° Strength 30,731. | | Allahabad. Latitude 25° to 28° Longitude 79° to 83° Strength 55,270. | | Agra. Latitude 26° to 30° Longitude 77° to 79° Strength 67,124. | | Lahore. Latitude 30° to 33° Longitude 71° to 77° Strength 63,707. | | Peshawur. Latitude 33° to 35° Longitude 72° to 74° Strength 32,087. | | Bengal Presidency. Latitude 22° to 25° Longitude 71° to 91° Strength 269,443. | | Total. | | Proportion of deaths to attacks. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Admitted | Died | A. | D. | A. | D. | A. | D. | A. | D. | A. | D. | A. | D. | Admitted | Died | |
| January.... .... | 11 | 4 | 4 | 1 | 5 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 21 | 5 | 42 | 10 | 1 n 4·2 |
| February......... | 54 | 26 | 5 | 1 | 14 | 5 | 2 | 0 | 4 | 0 | 0 | 0 | 79 | 32 | 158 | 64 | 1 in 2.4 |
| March........ .... | 99 | 63 | 73 | 40 | 51 | 27 | 5 | 1 | 3 | 0 | 0 | 0 | 240 | 131 | 471 | 262 | 1 in 1·7 |
| April... .... .... | 61 | 32 | 180 | 106 | 128 | 72 | 36 | 20 | 2 | 0 | 0 | 0 | 410 | 230 | 817 | 460 | 1 in 1·7 |
| May............... | 52 | 34 | 34 | 20 | 203 | 105 | 6 | 2 | 10 | 4 | 0 | 0 | 305 | 165 | 610 | 330 | 1 in 1·8 |
| June... .... ...... | 25 | 15 | 51 | 30 | 39 | 29 | 16 | 5 | 4 | 0 | 2 | 0 | 137 | 79 | 274 | 158 | 1 in 1·7 |
| July.............. | 16 | 8 | 73 | 41 | 120 | 65 | 480 | 279 | 12 | 7 | 73 | 31 | 774 | 430 | 1548 | 861 | 1 in 1·5 |
| August .. ....... | 173 | 96 | 44 | 27 | 301 | 217 | 663 | 407 | 870 | 524 | 17 | 13 | 2069 | 1284 | 4137 | 2568 | 1 in 1·6 |
| September........ | 14 | 5 | 4 | 5 | 131 | 90 | 124 | 77 | 196 | 140 | 15 | 10 | 474 | 327 | 958 | 654 | 1 in 1·4 |
| October... ...... .. | 35 | 23 | 8 | 3 | 19 | 13 | 17 | 5 | 3 | 7 | 64 | 42 | 164 | 93 | 310 | 186 | 1 in 1·6 |
| November... ... ... | 25 | 11 | 9 | 4 | 9 | 3 | 1 | 0 | 3 | 0 | 5 | 4 | 52 | 22 | 104 | 44 | 1 in 2·3 |
| December... ... ... | 12 | 11 | 4 | 0 | 3 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 21 | 12 | 42 | 24 | 1 in 1·7 |
| Total.. | 577 | 328 | 489 | 278 | 1023 | 627 | 1351 | 796 | 1109 | 682 | 176 | 100 | 4746 | 2810 | 9471 | 5621 | 1 in 1·684 |

The above table is only for six years ; but, it shows that cholera was less frequent and less severe in the four dry, cold months of the year ; more frequent and more severe, in the moist hot months of July and August ; and that the intensity of the attacks increased with the frequency.

| No. of Months. | Season of the Year. | Admissions. | Deaths | Proportion. |
|---|---|---|---|---|
| 4 | November, December, January and February. | 346 | 142 | 1 in 2·437 |
| 6 | March, April, May June September, October . . | 3440 | 2050 | 1 in 1·678 |
| 2 | July and August. . . .. | 5685 | 3429 | 1 in 1·657 |
|  | Total... | 9471 | 5621 | 1 in 1·684 |

Inspector General Murray has favoured me with another table bearing on this question. It is a Table of Monthly admissions and deaths from cholera, at Agra, among the European Troops, from 1837 to 1865, and the Native Prisoners from 1856 to 1865, from the Records of the Office of the Deputy Inspector General Agra.

Table of Monthly admissions and deaths from cholera at Agra among the European Troops from 1837 to 1865 and the Native prisoners from 1856 to 1865, from the Records of the Office of the Deputy Inspector General Agra.

| | European Soldiers. for 29 years 1837 to 1865. Aggregate Strength 30,569. | | | | Native Prisoners. for 10 years 1856 to 1865. Aggregate Strength 24,135. | | | | Total. Aggregate Strength 54,704. | | | | Proportion of deaths. to attacks. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Total. | | Ratio per 1,000 of mean strength | | Total. | | Ratio per 1,000 of mean strength | | Total. | | Ratio per 1,000 of mean strength | | |
| | Ad. | died. | Ad. | died. | Ad. | died. | Ad. | died. | Ad. | died. | Ad. | died. | |
| January... .. .... | 2 | 0 | 0·065 | 0·00 | 0 | 0 | 0·0 | 0.0 | 2 | 0 | 0·036 | 0·0 | 0 in 2 |
| February......... | 1 | 1 | 0·032 | 0·032 | 1 | 0 | 0·041 | 0·0 | 2 | 1 | 0·036 | 0·018 | 1 in 2·0 |
| March...... ...... | 10 | 2 | 0·327 | 0·065 | 8 | 0 | 0·331 | 0·0 | 18 | 2 | 0·339 | 0·036 | 1 in 9·0 |
| April...... ...... | 10 | 3 | 0·327 | 0·098 | 3 | 0 | 0·124 | 0·0 | 13 | 3 | 0·237 | 0·054 | 1 in 4·3 |
| May............. | 15 | 3 | 0·490 | 0·098 | 13 | 3 | 0·538 | 0·124 | 28 | 6 | 0·512 | 0·109 | 1 in 4·6 |
| June............. | 162 | 69 | 5·297 | 1·991 | 444 | 167 | 18·394 | 6·908 | 606 | 236 | 11·077 | 4·314 | 1 in 2·5 |
| July............... | 205 | 97 | 6·550 | 3·171 | 351 | 137 | 14·541 | 5·665 | 555 | 234 | 10·145 | 4·277 | 1 in 2·3 |
| August............ | 325 | 160 | 10·628 | 5·232 | 910 | 214 | 37·660 | 8·865 | 1235 | 374 | 22·576 | 6·826 | 1 in 3·3 |
| September.. .. .. | 70 | 45 | 2·289 | 1·471 | 7 | 10 | 0·280 | 0·414 | 77 | 55 | 1·396 | 1.005 | 1 in 1·4 |
| October... ...... ... | 17 | 9 | 0·556 | 0·294 | 0 | 2 | 0·00 | 0·083 | 17 | 11 | 0·309 | 0·210 | 1 in 1·5 |
| November.. .. ... | 8 | 4 | 0·261 | 0·131 | 2 | 0 | 0·083 | 0·0 | 10 | 4 | 0.183 | 0·073 | 1 in 2·5 |
| December... ... .. | 4 | — | 0·131 | 0·0 | 0 | 0 | 0·0 | 0·0 | 4 | 0 | 0·073 | 0·0 | 0 in 4· |
| Total... | 829 | 393 | 27·109 | 12·753 | 1739 | 533 | 71·104 | 34·722 | 2568 | 932 | 36·943 | 17·038 | 1 in 2·7 |

| Season. | Ad. | Died | Proportion. |
|---|---|---|---|
| 8 Months of October, November, December, January, February, March, April and May. | 67 | 22 | 1 in 3·045 |
| 4 Months of June, July, August and September. | 762 | 371 | 1 in 2·053 |
| Total... | 829 | 393 | 1 in 2·109 |

From the above table it will be seen that, in the 29 years, 1837 to 1865, amongst the European Soldiers at Agra, whose aggregate Strength was 30,569, there occurred 829 cases of cholera of which 393 or 1 in 2·109 died. But, of all the 829 attacks, only 67 took place in the cold dry and hot dry months from October to May, of whom only 1 in every 3·045 died; but 762 occurred in the hot moist months of June, July, August and September, of whom 1 in every 2·053 died. It is in the humid, hot, period of the year, in the Bengal Presidency, that the races are most liable to cholera; and, with the increase of cases, the intensity of the disease has increased.

|  | Ad. | Died | Proportion. |
|---|---|---|---|
| 9 Months September, October, November, December, January, February, March, April, May. | 34 | 15 | 1 in 2·266 |
| 3 Months June, July, August. | 1705 | 518 | 1 in 3·291 |
| Total... | 1739 | 533 | 1 in 3·262 |

Amongst the Native prisoners, of an aggregate strength of 24,135, in the 10 years, 1856-1865, there occurred 1739 cases of cholera of which 533, or 1 in every 3·262, died. But, of the 1739 cases, only 34 cases took place in the 9 months of September to May, of whom 1 in every 2·266 died; and 1705 happened in the three months June, July and August, of whom 1 in every 3·291 died. But, and in this the result differed from that of the Europeans to the extent, that, with the increase of cases, the intensity of the disease decreased. At page 48, there was a brief allusion to the varying intensity of this disease, according as it attacked different races, and the last table gives further information on that point.

In the central tract of the Dekhan, also, the greater prevalence of this disease, during the hot, moist, period of the year, is very marked. The Hyderabad country and Berar are within the range of the South-West monsoon, which brings the rains of that season during the months of

May, June, July, and August. The information obtained from this central part of Peninsular India is imperfect and, in some instances, is evidently erroneous; but, of the total of 6380 recorded deaths, 3782 occurred in the four months of May, June, July, and August. This fact will be seen from the subjoined table which likewise points to Secunderabad and Hyderabad as places where cholera is endemic or centres from which this disease is diffused.

# TABULAR STATEMENT SHOWING, SO FAR AS INFORMATION IS AVAILABLE, (THE ADMISSIONS ?) AND DEATHS FROM CHOLERA IN EACH MONTH, IN CIVIL AND MILITARY STATIONS OF THE HYDERABAD STATE, THROUGH A SERIES OF YEARS, FROM 1857 TO 1869.

| MONTHS. | TOTAL. |  | Aurungabad.<br>1857<br>1862<br>1865<br>1866<br>1869 |  | Akolah.<br>1854<br>1857<br>1864<br>1865<br>1866<br>1868<br>1869 |  | Akote.<br>1868 |  | Bolarum.<br>1859<br>1865<br>1868<br>1869 |  | Ballapore.<br>1868<br>1869 |  | Chandore.<br>1869 |  | Chickuldah.<br>1868<br>1869 |  | Darwah.<br>1869 |  | Ellichpore.<br>1858<br>1859<br>1860<br>1862<br>1863<br>1864<br>1865<br>1868<br>1869 |  | Hingolee.<br>1856<br>1857<br>1859<br>1860<br>1861<br>1862<br>1865<br>1868<br>1869 |  |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  | Admitted | Died. | Admitted | Died. | Admitted | Died. | Admitted | Died. | Admitted | Died. | Admitted | Died. | Admitted | Died. | Admitted | Died. | Admitted | Died. | Admitted | Died. | Admitted | Died. |
| January | 147 | 177 | 17 | 4 | 12 | 7 | ... | ... | 3 | ... | ... | ... | ... | ... | ... | .. | ... | ... | 1 | 1 | ... | ... |
| February | 131 | 56 | 7 | 3 | 9 | 2 | .. | ... | ... | ... | ... | ... | ... | .. | ... | ... | ... | ... | ... | ... | .. | ... |
| March | 118 | 79 | ... | ... | 41 | 16 | 2 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 1 | 1 | 2 | 2 |
| April | 268 | 140 | ... | ... | 14 | 3 | ... | ... | ... | ... | 1 | 1 | 61 | 15 | ... | ... | 26 | 3 | 6 | 2 | 4 | 2 |
| May | 395 | 639 | 60 | 18 | 4 | ... | ... | ... | 79 | 37 | ... | ... | 13 | 5 | ... | ... | 13 | ... | 3 | 2 | 11 | 4 |
| June | 173 | 443 | ... | ... | 13 | 7 | ... | ... | 50 | 20 | ... | ... | 4 | ... | 1 | ... | 1 | ... | 11 | 2 | 5 | 4 |
| July | 282 | 1,066 | ... | ... | 4 | 3 | .. | ... | 7 | 3 | ... | ... | 12 | 1 | ... | ... | ... | ... | 9 | 5 | 26 | 10 |
| August | 858 | 1,634 | ... | ... | 10 | 2 | 19 | 2 | 2 | 2 | 22 | 1 | 1 | ... | ... | ... | ... | ... | 13 | 6 | 22 | 12 |
| September | 130 | 152 | ... | ... | 3 | 2 | 3 | ... | ... | ... | 14 | 4 | 1 | 1 | 2 | ... | ... | ... | 1 | ... | ... | .. |
| October | 68 | 33 | ... | ... | 2 | ... | ... | ... | 16 | 8 | 34 | 6 | ... | ... | ... | ... | ... | ... | 4 | 2 | ... | ... |
| November | 226 | 128 | 1 | 1 | 1 | ... | ... | .. | ... | ... | 2 | ... | ... | ... | ... | ... | ... | ... | ... | ... | 2 | ... |
| December | 357 | 1,680 | ... | ... | ... | ... | ... | ... | 25 | 7 | ... | ... | ... | ... | ... | ... | ... | ... | 1 | ... | 1 | 1 |
| Grand Total | 3252<br>? | 6,380 | 85 | 26 | 113 | 42 | 24 | 2 | 182 | 77 | 73 | 12 | 92 | 22 | 3 | ... | 40 | 3 | 50 | 21 | 73 | 35 |

| MONTHS. | Jaulnah.<br>1864<br>1865<br>1868<br>1869 |  | Khamgaon.<br>1868<br>1869 |  | Kamptee.<br>1860<br>1866<br>1869 |  | Lingasoogoor.<br>1854<br>1869 |  | Mehkur.<br>1869 |  | Mulkapore.<br>1868<br>1869 |  | Mominabad.<br>1864<br>1865<br>1869 |  | Oomrawuttee.<br>1864<br>1865<br>1866<br>1868<br>1869 |  | Pallagaum.<br>1869 |  | Secunderabad.<br>1861<br>1864<br>1865<br>1866<br>1867<br>1868<br>1869 |  | Yeotmahl.<br>1865<br>1866<br>1869 |  |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  | Admitted | Died. | Admitted | Died. | Admitted | Died. | Admitted | Died. | Admitted | Died. | Admitted | Died. | Admitted | Died. | Admitted | Died. | Admitted | Died. | Admitted | Died. | Admitted | Died. |
| January | 1 | .. | ... | ... | .. | ... | ... | .. | .. | .. | . | .. | .. | ... | 12 | 7 | .. | ... | 39 | 22 | .. | .. |
| February | ... | ... | .. | ... | .. | .. | ... | ... | 1 | ... | .. | ... | .. | .. | 2 | 1 | ... | .. | 5 | 2 | 9 | 2 |
| March | ... | .. | ... | ... | ... | ... | ... | ... | ... | ... | .. | ... | ... | ... | ... | .. | ... | ... | 16 | 36 | 50 | 22 |
| April | 3 | 1 | ... | .. | 5 | 1 | .. | ... | ... | ... | ... | .. | . | ... | 97 | 12 | ... | ... | 26 | 21 | 113 | 39 |
| May | 46 | 21 | .. | ... | ... | ; | 2 | 2 | 1 | ... | ... | .. | 1 | 1 | 63 | 4 | 1 | ... | 83 | 39 | 8 | 2 |
| June | 27 | 10 | .. | ... | 2 | 1 | 1 | 1 | .. | ... | 7 | 1 | 8 | 5 | 2 | 1 | ... | ... | 42 | 17 | .. | .. |
| July | 38 | 11 | 15 | 8 | 3 | 1 | 8 | 4 | 2 | .. | .. | ... | 1 | 1 | 27 | 8 | .. | ... | 90 | 44 | 18 | 4 |
| August | 93 | 29 | 28 | 11 | 12 | 4 | .. | ... | 14 | 3 | 25 | 3 | ... | ... | 42 | 11 | 1 | ... | 550 | 310 | 1 | .. |
| September | 65 | 21 | 1 | ... | .. | ... | .. | ... | 2 | ... | .. | ... | ... | ... | 3 | 1 | 3 | ... | 32 | 62 | ... | .. |
| October | ... | ... | ... | ... | .. | .. | .. | .. | 2 | 2 | ... | ... | ... | .. | ... | ... | ... | .. | 10 | 15 | .. | .. |
| November | ... | ... | ... | ... | 1 | 1 | ... | ... | .. | ... | .. | ... | ... | ... | .. | .. | ... | .. | 160 | 100 | .. | .. |
| December | .. | .. | ... | .. | ... | .. | .. | ... | ... | ... | .. | ... | ... | .. | ... | .. | ... | .. | 44 | 50 | .. | .. |
| Grand Total | 273 | 93 | 44 | 19 | 23 | 8 | 11 | 7 | 22 | 5 | 32 | 4 | 10 | 7 | 248 | 45 | 5 | ... | 1,097 | 718 | 199 | 69 |

| MONTHS. | 5th Infantry, H. C., on march from Bolarum to Lingasoogoor.<br>1868 |  | 1st Cavalry, H. C., from Hingolee. to Aurungabad.<br>1868<br>1869 |  | 3rd Cavalry H. C., from Bolarum to Hingolee.<br>1868 |  | H. M. 4th M. N. I. from Madras to Secunderabad.<br>1865 |  | Hyderabad City and Vicinity. |  |  |  |  |  |  |  |  |  | At a Distance from Hyderabad State. |  |  |  |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  |  |  |  |  |  |  |  |  |  |  |  |  | Hyderabad. |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  | Bolarum.<br>1859<br>1865<br>1868<br>1869 |  | Chudder-ghat.<br>1868<br>1869 |  | Inside.<br>1868<br>1869 |  | Outside.<br>1868<br>1869 |  | Secunderabad.<br>1861<br>1864<br>1865<br>1866<br>1867<br>1868<br>1869 |  | Berhampore.<br>1859<br>1860<br>1861 |  | Thayetmeo.<br>1865 |  |
|  | Admitted | Died. | Admitted | Died. | Admitted | Died. | Admitted | Died. | Admitted | Died. | Admitted | Died. | Admitted | Died. | Admitted | Died. | Admitted | Died. | Admitted | Died. | Admitted | Died. |
| January | ... | .. | 59 | 2 | .. | ... | ... | ... | 3 | .. | 3 | 2 | .. | 132 | .. | .. | 39 | 22 | .. | ... | .. | .. |
| February | ... | .. | .. | ... | .. | ... | 98 | 44 | .. | .. | .. | .. | ... | 2 | ... | .. | 5 | 2 | .. | ... | ... | ... |
| March | .. | .. | .. | .. | .. | ... | 5 | 2 | .. | .. | .. | ... | ... | .. | ... | .. | 16 | 36 | .. | .. | 1 | ... |
| April | .. | .. | .. | .. | .. | ... | 1 | ... | .. | ... | .. | .. | ? | 36 | ? | .. | 26 | 21 | 11 | 4 | ... | ... |
| May | .. | .. | .. | ... | .. | ... | ... | ... | 79 | 37 | .. | .. | .. | 373 | .. | 129 | 83 | 39 | 7 | 2 | .. | ... |
| June | .. | .. | .. | ... | .. | .. | .. | ... | 50 | 20 | .. | .. | ... | 251 | ... | 123 | 42 | 17 | ... | .. | .. | .. |
| July | .. | ... | .. | .. | .. | ... | 1 | ... | 7 | 3 | .. | .. | .. | 708 | .. | 249 | 90 | 44 | 20 | 6 | .. | ... |
| August | ... | .. | .. | .. | ... | .. | ... | .. | 2 | 2 | .. | .. | .. | 943 | .. | 292 | 550 | 310 | 3 | 3 | .. | ... |
| September | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | ... | 51 | .. | 10 | 32 | 62 | .. | ... | ... | ... |
| October | .. | .. | .. | .. | .. | .. | .. | ... | 16 | 8 | .. | ... | ... | .. | .. | ... | 10 | 15 | .. | .. | ... | ... |
| November | 4 | 1 | ... | .. | .. | ... | ... | .. | ... | .. | 55 | 26 | ... | 60 | .. | 92 | 160 | 100 | .. | ... | ... | ... |
| December | 68 | 31 | 1 | 1 | 137 | 82 | ... | .. | 25 | 7 | 80 | 34 | .. | 558 | ... | 916 | 44 | 50 | .. | ... | .. | ... |
| Grand Total | 72 | 32 | 60 | 3 | 137 | 82 | 105 | 46 | 182 | 77 | 138 | 62 | ? | 3,114 | ? | 1,811 | 1,097 | 718 | 41 | 15 | 1 | ... |

There are known facts which seem to indicate that cholera has long been occurring in particular localities in India, and from time to time spreading abroad. I have remarked above that Secunderabad and Hydorabad in the Dekhan are places where cholera is endemic, forming a centre from which this disease spreads. In the Peninsula of India, the Ceded Districts comprising the Collectorates of Bellary, Kurnool and Cuddapah, the northern part of Mysore, the town of Madras, all the Southern Mahratta Country and Akolah in Berar, seem to be centres, as also all the countries in the watersheds of the river Toonga, Bhudra, Toombudra, Gutpurba, Malpurbah, of parts of the Kistnah and Godavery and their affluents, and of the Cauvery, Pennar and Palar rivers. Dr. Macnamara, in his work on cholera when writing on this point is quoted as of opinion, that, "if we draw an imaginary line to the North East, through Saugor, Allahabad, and Gorruckpore to the foot of the Himalayas, throughout the whole of the plains to the East of this line, cholera is endemic, the intensity of the disease increasing as we approach the sea-board of the Bay of Bengal, the cities of Dacca and Calcutta being pre-eminently the strong-holds of this terrible malady. Cholera, he adds, is less frequently met with as we advance to the North-West and West from the line I have above indicated, until the disease may, with certainty, be said not to be endemic in the Punjab, in Rajpootanah and Sind. But, along the valley of the Nerbuddah and Taptee rivers and throughout a very considerable part of the Bombay Presidency, cholera is endemic." Dr. Bryden has also writtten largely on this subject and indicates the countries near the lower course of the river Ganges, as centres of diffusion and an abstract of his views may be here given. Calcutta is regarded by Dr. Bryden as typical of the endemic tract, and cholera is never absent from it, though it assumes a more active state in March, April and May, as will be seen by the marginal statement of deaths from cholera there. Dr. Bryden also gives tabular statements illustrating the seasons in which cholera occurs in the Eastern and Western divisions of the epidemic area.

CHOLERA DEATHS.

| Months. | Calcutta General population for 26 Yrs. Macpherson. | General Hospital 9 years 1860-1868 Brougham. | Native Troops Calcutta Barrackpore. Dum-Dum 10 years 1858-1867. |
|---|---|---|---|
| January | 7150 | 11 | 13 |
| February | 9346 | 40 | 33 |
| March | 14710 | 93 | 70 |
| April | 19382 | 75 | 64 |
| May | 13335 | 96 | 83 |
| June | 6325 | 78 | 43 |
| July | 3979 | 27 | 28 |
| August | 3440 | 33 | 26 |
| September | 3935 | 20 | 24 |
| October | 6211 | 33 | 29 |
| November | 8323 | 33 | 34 |
| December | 8159 | 8 | 25 |
| Total | 104295 | 547 | 472 |

| | Total. Ad. | January. | February. | March. | April. | May. | June. | July. | August. | September. | October. | November. | December. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Jail Population. (*a*) Of the Eastern Division of the epidemic or invaded area 1859 to 1865 | 3334 | 5 | 30 | 438 | 653 | 390 | 321 | 629 | 522 | 151 | 100 | 83 | 12 |
| European Army do. 1854 to 1867. | 1023 | 4 | 4 | 59 | 219 | 131 | 64 | 127 | 278 | 110 | 18 | 8 | 1 |
| Jail Population. (*b*) Of the Western Division of the epidemic or invaded area. 1860 to 1867 | 2462 | ... | ... | ... | 17 | 43 | 55 | 379 | 1842 | 97 | 27 | 2 | ... |
| European Army do. 1859 to 1866. | 1688 | ... | ... | ... | 1 | 8 | 5 | 339 | 1007 | 257 | 61 | 10 | ... |

From the above table, obtained from Dr. Bryden's Report, it is shown that in the Eastern division of the epidemic area, cases of cholera occur, both amongst Europeans and Natives, in every month of the year, though from March to April and July and August are the months of their greatest frequency. But in the Western division of the epidemic area, the bulk of the cases occur in June to September, and no cases for the six or seven years under review occurred in December to March.

The Bhaugulpore Jail in the valley of the Ganges, is mentioned by Dr. Bryden as 154 feet above the level of the sea. He regards the cholera of Bhaugulpore Jail, as very intimately related in season to that of Midnapore. In the 12 years for which he gives the return there was no case in January or December, only one in February and three in October but nearly half the cases occurred in April,

| Period | Total. | | March. | April. | May. | June. | July. | August. | September. | November. | Remaining 5 months. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Ad. | died | | | | | | | | | |
| 12 years 1856 to 1867 | 571 | 240 | 63 | 212 | 57 | 96 | 31 | 89 | 19 | 16 | 4 |

The Patnah and Deegah Jail he describes as built on the great kunkar clay formation, 185 feet above the sea-level, and also typical for the valley of the Ganges. In the same 12 years period, out of 624 cases and 246 deaths only 4 cases occurred in December, January, and February, and 24 in May and June, the remainder being pretty equally distributed through the other months, which he regards as illustrative of the spring and the monsoon cholera.

Allahabad Jail is considered by Dr. Bryden as typical of the Eastern division of the epidemic area. Its cholera has occurred all through from March to September.

| Period. | Total. |  | March. | April. | May. | June. | July. | August. | September. | 5 Remaining Months. |
|---|---|---|---|---|---|---|---|---|---|---|
|  | Ad. | died |  |  |  |  |  |  |  |  |
| 11 years, viz. 1856 and 1858 to 1867. | 338 | 153 | 25 | 17 | 106 | 132 | 17 | 24 | 14 | 3 |

In Backergunge Jail, built on the diluvium of the Sunderbuns, the occurrence of cholera seems to take place twice a year, in the months March to June and again in November and December, and, for twelve years, no case appeared in August and September. Dr. Bryden describes this Jail as typical of the endemic basin, in which cholera predominates at the two seasons March to June and from the end of October to December : out of 333 cases in twelve years 301 occured in six of the months, March to June and November and December.

| Period. | Total. |  | March. | April. | May. | June. | November. | December. | other 6 months. |
|---|---|---|---|---|---|---|---|---|---|
|  | Ad. | died. |  |  |  |  |  |  |  |
| 12 years 1856 to 1867 | 333 | 156 | 68 | 70 | 38 | 14 | 55 | 56 | 32 |

The Midnapore Jail is built on laterite and but little elevated above the sea. It is regarded by Dr. Bryden as illustrative of the cholera seasons in the districts bordering on the endemic basin. In the 12 years, 1856 to 1867 no case occured in January or September, and 495 out of the 505 seizures occurred in the five months of the year February to April and June and July. He regards that jail and its district as subject to the spring cholera and the cholera of June and July as the homologue of the monsoon cholera of the epidemic area

| Period. | Total. |  | February. | March. | April. | June. | July. | The other 7 months. |
|---|---|---|---|---|---|---|---|---|
|  | Ad. | died |  |  |  |  |  |  |
| 12 years. 1856 to 1867 | 505 | 238 | 24 | 108 | 90 | 258 | 15 | 10 |

Dr. Brydon at p. 2 39 gives the marginal Statement of cholera admissions into the Pilgrim Hospital at Pooree in each month of the 25 years 1842 to 1866, in which out of a total of 2,431 cases, 1,793 occurred in the two months June and July.

| Period. 25 years. | Total Admitted. | January. | February. | March. | April. | May. | June. | July. | August. | September. | October. | November. | December. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1842 to 1866 | 2431 | 56 | 127 | 313 | 28 | 15 | 1255 | 538 | 13 | 6 | 15 | 52 | 13 |

A record is given by Dr. Brydon (p. 208-9) of the deaths from cholera at Cawnpore, during the 43 years 1826 to 1868. In that period, there were 888 deaths, of which only 53 occurred in the 7 months October to April, inclusive, the heaviest mortality occurring in June, July, August and September, but culminating in August.

In Meerut, during the 6 years, 1856, 1857, 1858, 1861, 1862 and 1867, 383 cases occurred amongst the European troops, of which 377 were admitted in the three months July August and September.

The North West Provinces has an estimated population of 29,588,653, amongst whom, in 1868, there were 16192 deaths March to September being the period of greater prevalence. Also, in the Punjab, the population of which is estimated at 17,586,232, there were 531 deaths in that, which was a non-epidemic, year.

| | North West Provinces. | Punjab |
|---|---|---|
| January..... | 516 | 48 |
| February... | 290 | 26 |
| March..... | 1202 | 31 |
| April...... | 1593 | 44 |
| May....... | 2381 | 71 |
| June...... | 2565 | 64 |
| July....... | 2507 | 43 |
| August...... | 2260 | 41 |
| September.. | 1438 | 37 |
| October..... | 828 | 85 |
| November.. | 361 | 24 |
| December . | 251 | 17 |
| Total... | 16,192 | 531 |

Nagpore Jail is 935 feet above the sea-level, and other jails in Central India are at Bhandara, Chanda and Raepore, and it is in March to October that cholera cases have occurred there. Dr. Bryden regards the relation of the Nagpore locality to cholera, to be the same as that of the Bengal districts bordering on the endemic area, as typically shown in the cholera of the Midnapor jail or of the jails low down in the valley of the Ganges.

| Period. | Total. | | March. | April. | May. | June. | July. | August. | September, | October. | November. | 3 other months |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Ad. * | Died | | | | | | | | | | |
| 11 years 1856 & 1858 to 1867 | 685 | 327 | 66 | 54 | 115 | 68 | 264 | 49 | 7 | 15 | 1 | 0 |

He also regards the central jails in the North West of India at Agra, Meerut, Bareilly and Lahore, as typical of the western division of the epidemic area, in which the monsoon cholera predominates and he shows that it is during the continuance of the monsoon that the epidemic manifestation occurs in its intensity in those regions.

| Period. | Total. | | June. | July. | August. | September. | Other 8 months. |
|---|---|---|---|---|---|---|---|
| | Ad. | Dd | | | | | |
| 8 years 1855, 1860, 1861, 1862, 1863, 1865, 1866, & 1867. | 3318 | 1337 | 444 | 602 | 2034 | 202 | 36 |

Dr. Bryden, at page 115 of his report, gives the following table, to show, from the cholera deaths registered in the 18 years 1848 to 1865, in the Island of Bombay, the periods of the year in which cholera is most active there :

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* NOTE.—The total of admissions at page 37 of Dr. Bryden's report, does not correspond with the total of the monthly figures,—there are only 639.

| Year. | January. | February. | March. | April. | May. | June. | July. | August. | Septr. | October. | Novr. | Decr. | Total. | Remarks. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1848 | 0 | 11 | 7 | 17 | 10 | 9 | 6 | 2 | 2 | 0 | 5 | 0 | 69 | |
| 9 | 0 | 0 | 1 | 4 | 1 | 0 | 0 | 121 | 690 | 369 | 260 | 682 | 2128 | Invading epidemic of 1819 |
| 1850 | 141 | 53 | 269 | 607 | 296 | 259 | 324 | 348 | 143 | 51 | 53 | 453 | 2997 | |
| 1 | 1873 | 905 | 1013 | 601 | 373 | 339 | 73 | 37 | 25 | 19 | 20 | 207 | 5485 | |
| 2 | 408 | 91 | 160 | 271 | 149 | 151 | 165 | 66 | 19 | 10 | 6 | 24 | 1520 | |
| 3 | 23 | 3 | 13 | 5 | 16 | 9 | 6 | 6 | 56 | 250 | 571 | 240 | 1148 | ,, ,, ,, 1853 |
| 4 | 214 | 299 | 372 | 724 | 520 | 950 | 317 | 68 | 14 | 11 | 9 | 9 | 3507 | |
| 5 | 60 | 22 | 22 | 302 | 585 | 273 | 167 | 52 | 75 | 46 | 21 | 20 | 1645 | |
| 6 | 154 | 266 | 241 | 358 | 280 | 197 | 89 | 22 | 19 | 38 | 40 | 142 | 1846 | ,, ,, ,, 1856-57 |
| 7 | 459 | 165 | 306 | 363 | 249 | 302 | 157 | 86 | 32 | 31 | 18 | 13 | 2181 | |
| 8 | 19 | 9 | 8 | 15 | 11 | 9 | 5 | 8 | 11 | 6 | 7 | 7 | 115 | |
| 9 | 9 | 10 | 9 | 7 | 69 | 843 | 329 | 170 | 41 | 85 | 131 | 282 | 1985 | ,, ,, ,, 1859 |
| 1860 | 289 | 332 | 396 | 321 | 163 | 107 | 89 | 128 | 51 | 47 | 29 | 9 | 1961 | |
| 1 | 15 | 18 | 5 | 4 | 12 | 18 | 13 | 10 | 11 | 34 | 35 | 466 | 641 | |
| 2 | 625 | 240 | 339 | 260 | 367 | 218 | 117 | 95 | 161 | 272 | 201 | 269 | 3164 | |
| 3 | 189 | 50 | 89 | 161 | 153 | 161 | 412 | 240 | 178 | 181 | 176 | 319 | 2309 | ,, ,, ,, 1863-4 |
| 4 | 622 | 401 | 302 | 680 | 837 | 395 | 371 | 351 | 232 | 88 | 137 | 431 | 4847 | |
| 5 | 363 | 540 | 522 | 356 | 624 | 206 | 116 | 62 | 31 | 32 | 22 | 13 | 2887 | |
| Total.... | 5463 | 3415 | 4074 | 5056 | 4715 | 4456 | 2756 | 1872 | 1741 | 1570 | 1741 | 3586 | 40,445 | |

It will be observed from the above that cholera has occurred in Bombay in every month of the 18 years for which this tabular statement is given. The disease begins to slumber there in July and remains comparatively quiet till the end of November. In December of the mortality, at once, doubles; almost doubles again in January and ebbs and flows at a very high rate until the end of June, falling very considerably again in July

In the 8 months of the 18 years, from December to July inclusive, out of 40,445, deaths, 33,521 of them occurred, or at the average monthly rate of 4190·1 deaths, the average of the other four months August to November being at the rate of 1731 deaths per month.

At several places in his book Dr. Bryden records his opinions as to tho value of prophylactic and curative and quarantine measures for this disease, and the value of disinfectants and conservancy.

At p. 219, he is of opinion that the utmost that is to be hoped for, in all efforts to diminish the attacks of cholera amongst Europeans, is to reduce their rates of attack and death to that of the Native army.

He (page 232) cites mental depression as a great exciting cause of the cholera miasm taking effect on individuals.

At page 213, noticing the value of abortive measures, he remarks that "there is no reason to question the truth of the statement that cholera "may be cut short in its earliest stage by sedatives and antispasmodics."

He is of opinion (p 214) that "no one" "would hesitate to recommend "the use of prophylactic measures when threatened. But the general use of "prophylactic measures, will not, in very many cases, prevent the development of the out-break, although some, perhaps not a few, lives will "be saved by the fact of the individual being carried over the critical "point which must be surmounted if he is to escape cholera and death."

On the question of the contagious nature of this disease he remarks p. (214) "that the tainted stratum of air, over a sleeping mass may be "selected by the cholera miasm" * * "But the empirical assertion "that, because cholera is a contagious disease its ravages can be con-"trolled by precautions directed against contagion, is a grave error ; and "not the less so because it has been so universally assented to of late."

Writing (p.214) on the theory that the emanations from those already affected are of a poisonous character, Dr. Bryden does "not go so far as to say "that the evidence against the presence of the cholera germ in the evacua-"tions is decisive." "On the contrary" he thinks it probable that latrines "are occasionally infected, and especially hospital latrines" * * But, he adds, "in this country we do not hold, except as a theory, the trans-"mission of cholera by means of the evacuations, although we recognise "the destruction of such materials to be a duty incumbent upon all who "are called on to treat cholera."

Writing of disinfectants (p. 217) Dr. Bryden remarks that he "can form "no very high estimate of the practical utility of disinfectants towards

" lessening the intensity of an out-break, even granting that all that has " been said in their favour be true."

A point remaining to be alluded to is the duration of an attack of cholera when occurring in an epidemic form amongst native soldiers when marching. At p. 10 of the Cholera Report by Doctor Lorimer, is the following:

Return showing the number of days the cholera continued, with corps marching, in each epidemic attack from 1820 to 1844 inclusive.

| Duration of each outbreak | Under 10 days | From 10 to 20 days | From 20 to 30 days | From 30 to 40 days | From 40 to 50 days | From 50 to 60 days | From 60 to 80 days | Total. |
|---|---|---|---|---|---|---|---|---|
| Number of Regiments attacked | 18 | 42 | 28 | 18 | 6 | 6 | 3 | 121 |

Of 121 epidemic attacks, the disease disappeared in 60 corps within 20 days, and, within 40 days, it disappeared from 106 corps out of 121.

It would moreover appear, from a table at the same page, that this disease, when it assumes an epidemic form, presents three stages, viz: 1st, that of its accession, which lasts four or five days, during which the cases that occur are few in number and of little severity; 2nd, the virulent stage then commences, and lasts for 8 or 9 days, during which numerous cases occur; 3rd, the disease then declines in frequency, and within the next ten days it disappears, the average duration of the epidemic being only 24 days.

The history of 20 of the more severe epidemic attacks is thus recorded:

| Period 1821 to 1844. | Duration of Epidemic. | | | | | | | Virulence of Epidemic. | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Number of Regiments. | Strength. | Days. | Number Attacked. | Number died. | Per day. | | No of days before the disease became virulent. | Duration of virulence. | Number attacked. | Number died. | Per day. | |
| | | | | | | Admitted. | Died. | | | | | Admitted. | Died. |
| Total | 19 Regiments, were 20 times attacked. | 17,878 | 483 | 2,706 | 1,181 | 120 | 51 | 93 | 174 | 2,104 | 959 | 227 | 100 |
| Average. | | 893·9 | 24 1 | 135·3 | 59·0 | 6 | 2·6 | 4·6 | 8·7 | 105 | 47·9 | 11·3 | 5 |

In those 19 regiments 4½ days elapsed on the average before the disease assumed its virulent character; for the nine succeeding days the disease was both more frequent and somewhat more intense: and in the following eleven days, on the average, it disappeared. Another arrangement of these data will make the intensity of the different stages more apparent.

| | There were attacked | There died | Proportion of deaths to attacks. |
|---|---|---|---|
| Amongst the 19*Regiments, during the continuance of the Epidemic.......... .. ... .. ......... | 2706 | 1181 | 1 in 2·29 |
| Deduct the numbers recorded as having occurred in the 8·7 days of the virulent stage........... | 2104 | 959 | 1 in 2·19 |
| Leaving the numbers that occurred previous and subsequent to the period of virulence.......... | 602 | 222 | 1 in 2·71 |

It will be observed that 2104 or three-fourths of all the admissions took place in the 9 days that the virulent stage lasted, the remaining 602 admissions having occurred during the 15 preceding and succeeding days. It will be observed, also, that the disease was then virulent both as to the numbers attacked and as to the intensity of the disease, the proportion of deaths to admissions having been 1 in every 2·1 or 44 per cent, while the virulence continued, while only one death in every 2.7 admissions or 36 per. cent of deaths occurred amongst the patients admitted during the 4½ days before and the 11 days after this virulent period.

Each of these two tables contain data from which important deductions may be drawn. They show the value of curative measures to be different during the periods of accession, virulence, and decline; they show that with regiments marching even the severest epidemics have not, on the average, continued longer than 24 days, and this, combined with the knowledge of its three stages, will enable us to regulate our measures of prevention.

Dr. Bryden, also, at pages 194 and 195, gives two tabular statements to show the duration of the disease after an out-break.

In the 11 years 1856 to 1866, there were 104 out-breaks among the

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* The Regiments were the 3rd, 4th, 9th, 10th, 11th, 15th, 16th, 19th, 23rd, 24th, 30th 36th, 38th, 32d, 43d, 46th, twice, 47th, 48th, and 52nd, M. N. I.

European troops in the Bengal Presidency, in the months of February to October, but upwards of half the deaths occurred in the two months July and August.

| Number of fatal cases out of the admissions of each day. | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Day... | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 |
| Deaths. | 164 | 143 | 147 | 131 | 155 | 138 | 119 | 130 | 132 | 102 | 107 | 72 | 62 | 73 | 65 | 56 | 43 | 43 | 48 | 31 | 27 | 34 | 20 | 23 | 7 | 11 | 11 | 8 |

Also on the first day of the out-break the deaths were most numerous. the deaths decreased for two days and remained stationary or increased for one day and no fatal case occured after the twenty-eighth day. In commenting on this table Dr. Brydon observes that the out-break may have three special aspects each significant of a different phase :—*first*, the out-break may be typical, comprised within ten days from the date of poisoning; *second*, it may be supplemented by conditions of locality, so that it may endure from the date of attack up to the date of the reproduction : and in the *third* aspect while the type presented is evidently that normal for the minimum, the affection of the body is maintained to about the 16th and 17th day." * * "I have, he adds, written the history of the cholera miasm as that of a thing individualized and appreciable, due at a certain date in a certain situation; budding forth from the soil because it has been sown there ; revitalized in relation to what it is as a thing organized, and advancing, when invading, with a front as wide stretching as is the breadth of the natural province which is being covered. I have described the persistence between two definite dates as due, not to any meteorological reason, and certainly not to any contingency secondary to human infection ; but as a leaf, or a flower, or an insect has a temporary existence absolutely defined and yet manifested in obedience to a known meteorology so has the vitalized cholera its life-period which no combination of conditions (however powerful these may be) can prolong."

Dr. Bryden (p. 87) considers three conditions to be essential for manifest epidemic progress, viz: (1) the presence of the cholera miasm : (2) a humid atmosphere, which is in every case its vehicle : and (3) a prevailing wind giving direction and limitation to this humid atmosphere:

When examining the returns from bodies of troops in the same or neighbouring cantonments, the attention is almost immediately arrested by observing the difference in the ratio of admissions from cholera in places closely adjoining each other. It will be observed, for instance, in the following table, that the Europeans stationed in Fort St. George, from 1829 to 1838, had 28.03 per 1,000 of their strength admitted from cholera, while the Europeans at Poonamallee, 13 miles distant, had only 4·36 per 1,000 of their strength admitted during the same period.

A similar difference is observable in the Returns from the Europeans at St. Thomas' Mount, a station 10 miles distant from Fort St. George, the European Horse Artillery there having had 13.36 per 1,000 admitted from cholera in the 10 years from 1829 to 1838, while the European Foot Artillery, a few hundred yards off, had only 2·5 per 1,000 admitted during the same period ; and these instances are so numerous, that they may be arranged in the following

Table, showing the ratio per 1,000 of mean strength of troops in adjoining localities, attacked with cholera.

| | Average annual Ratio per 0000 of mean strength admitted. |
|---|---|
| Fort St. George.—European Infantry and Artillery for 10 years 1829 to 1838................ | 28·03 |
| Poonamallee..........(13 miles distant) Europeans, 10 years 1829 to 1838.................. | 4·36 |
| St. Thomas' Mount—(10 miles from Fort St. George) European Horse Artillery 9 years 1829 to 1838 exclusive of 1831,....... | 13·36 |
| European Foot Artillery 1¼ mile distant, from the Horse Artillery 10 years 1829 to 1838.... | 2·50 |
| Secunderabad..H. M. European Infantry 10 years 1829 to 1839 exclusive of 1833........ | 9·91 |
| H.E. I. Co.'s European Foot Artillery 1¼ mile distant, 1829-to 1840..................... | 4·34 |
| Kamptee....H. E. I. Co.'s Madras European Regiment, 10 years 1829 to 1839 exclusive of 1831. | 19·26 |
| H. E. I. Co.'s European Horse Artillery 1829 to 1839 inclusive | 11·12 |
| H. E. I. Co.'s European Foot Artillery, 1829 to 1839 ........... | 8·26 |
| Trichinopoly....H. M. European Infantry for 1829 to 1831, 1833, to 37 and 39 .......... | 8·02 |
| H. E. I. Co.'s European Foot Artillery from 1832 to 1841...... | 3·14 |

| | | Average annual Ratio per 1000 of mean strength admitted. |
|---|---|---|
| Bangalore.... | H. M. European Infantry, 8 years 1831 to 1838........................ | 34·61 |
| | H. M. Dragoons (contiguous to above) 9 years 1830 to 1838.... | 13·16 |
| | H. E. I. Co.'s Foot Artillery ¼ mile distant, 12 years 1830 to 1841..... ................ | 9.00 |
| | H. E. I. Co.'s Horse Artillery contiguous to Foot Arty. 11 years 1829 to 1842.......... | 4.81 |
| Bellary....... | H. E. I. Co.'s Foot Artillery, 9 years 1833 to 1841. | 28.93 |
| | H. M. European Infantry, contiguous, 10 years 1829 to 1838.. | 19·36 |
| Madras..... | Native Infantry 10 years 1829 to 1838............ | 4.37 |
| St. Thomas' Mount— | 10 miles distant, Native Golundauze, 9 years, 1829 to 1868, exclusive of 1832............................. | 3.84 |
| Palaveram.. ...... | 13 miles distant, Native Infantry (period not specified).................... | 0.25 |

While alluding to the occurrence of cholera in Northern India during the hot, moist period of the year, there are facts observable which show that the agent influencing the out-breaks of this disease, is neither heat alone nor heat and moisture combined. For instance, as Dr. Pearse writes, Malabar and Canara, on the Western coast of India, is clothed with trees and covered with a humid atmosphere, from May to October, during which the rains of the South-west monsoon are falling.

The Ceded Districts, on the other hand are hot, but arid.

These two districts or provinces, differ widely in their geological formation, elevation, temperature, moisture, rain-fall &c. The per-centage of deaths from cholera to the total mortality for a period of 15 years was

| | | |
|---|---|---|
| In Malabar and Canara | Europeans............ | 4.6 |
| ,, | Natives ............ | 12.4 |
| In the Ceded Districts | Europeans ....... | 55.9 |
| ,, | Natives .................. | 52.8 |

If the mortality from cholera be excluded, the deaths in Bellary for the 10 years to which the above refer amounted only to 13.2 per thousand of Europeans, and 6·1 per thousand of native troops. But for the occasional out-break of epidemic cholera in Bellary, that station would have stood very high in the sanitary list. It has however been visited from time to time very severely by this disease. The death-rate of Europeans stationed in the Ceded Districts from 1829 to 1838 was 31 per thousand, and of native troops 16 per thousand. For a later period of 14 years viz. from 1842 to 1856-7, it was 34 per thousand in European troops, and the native mortality remained exactly the same viz. 16 per thousand. The diminished value of European life in the later period was the result of losses from epidemic cholera, as will be seen from the following table :—

| | | Aggregate strength. | Total Deaths. | Deaths from Cholera. | Per centage of Cholera Deaths to whole Mortality. |
|---|---|---|---|---|---|
| From 1829 to 1838. | European. | 9,000 | 285 | 62 | 21·75 |
| | Native. | 35,999 | 581 | 283 | 48·7 |
| From 1842 to 1856-7. | European. | 10,400 | 359 | 201 | 55·9 |
| | Native. | 56,437 | 937 | 488 | 52·08 |

Dr. Pearse adds that although the station of Bellary itself does not show the above high rate of cholera mortality, yet for the 10 years to which his remarks and the foregoing tables refer, the cholera deaths were 26·6 per cent. of the whole, a very high rate for any cantonment or station.

Dr. Macnamara writing on this point (p. 293) asserts " that no wide-" spread epidemic has ever occurred in India unless during or immediate-" ly after rain." And, at page 292, he observes that this point was noticed by the Bengal Medical Board, in their Report on the out-break of 1817 and 1818, in which, when alluded to the accompanying meteorological phenomena, they clearly demonstrated that the out-bursts " of the disease in almost every instance, was preceded" " by a long course of unusually humid and sultry weather ; and that its subsequent periods of increase and decline were always modified by changes of the weather."

Dr. Macnamara's book, contains a monthly tabular statement of the deaths in Madras town from cholera, for the ten years 1855 to 1864.

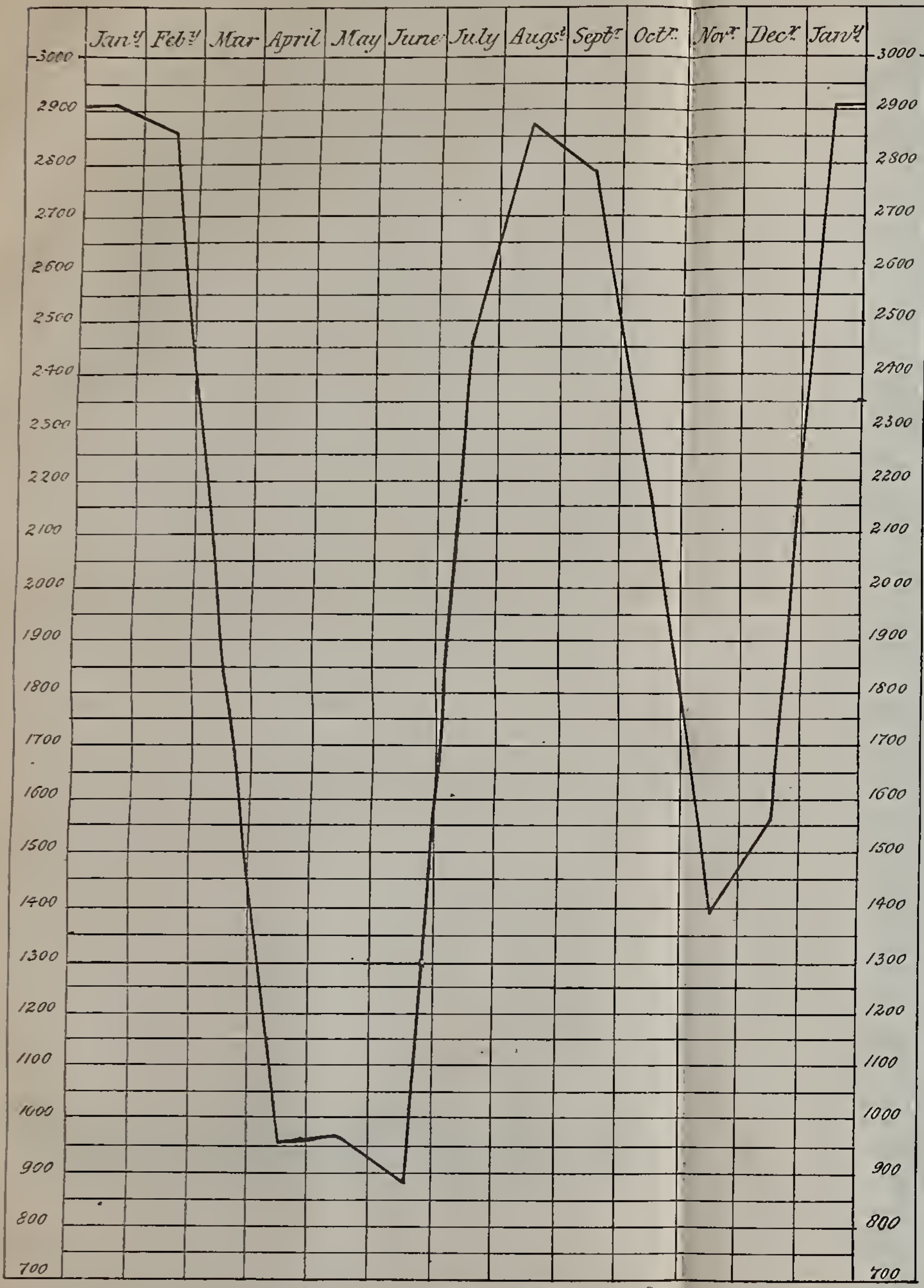
On applying to Dr. Cornish, Sanitary Commissioner for Madras, he has obligingly furnished me with the following :—

Return showing the deaths in Madras, from Cholera, in each month of the fifteen years 1855 to 1869.

| Years. | MONTHS. | | | | | | | | | | | | Total. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | January. | February. | March. | April. | May. | June. | July. | August. | Septr. | October. | Novr. | Decr. | |
| 1855 | 305 | 351 | 136 | 30 | 14 | 2 | 6 | 45 | 390 | 358 | 207 | 112 | 1956 |
| 1856 | 167 | 128 | 181 | 132 | 147 | 29 | 12 | 2 | 1 | 3 | 1 | 2 | 805 |
| 1857 | 4 | 152 | 161 | 135 | 81 | 126 | 114 | 74 | 117 | 115 | 138 | 160 | 1377 |
| 1858 | 433 | 323 | 126 | 28 | 116 | 92 | 94 | 111 | 128 | 128 | 137 | 249 | 1965 |
| 1859 | 349 | 463 | 130 | 72 | 20 | 10 | 12 | 7 | 6 | 3 | 2 | 8 | 1082 |
| 1860 | 3 | 2 | | 6 | 22 | 87 | 1218 | 637 | 276 | 160 | 91 | 76 | 2580 |
| 1861 | 38 | 75 | 54 | 150 | 204 | 76 | 183 | 599 | 786 | 343 | 107 | 161 | 2776 |
| 1862 | 425 | 485 | 229 | 102 | 189 | 267 | 126 | 222 | 242 | 501 | 519 | 328 | 3635 |
| 1863 | 372 | 452 | 455 | 154 | 84 | 19 | 5 | 8 | 2 | 46 | 10 | 77 | 1684 |
| 1864 | 133 | 110 | 106 | 45 | 3 | 4 | 4 | 97 | 38 | 15 | 9 | 10 | 574 |
| 1865 | 121 | 72 | 54 | 20 | 10 | 4 | 33 | 302 | 120 | 118 | 45 | 45 | 944 |
| 1866 | 99 | 73 | 149 | 83 | 77 | 160 | 577 | 544 | 534 | 283 | 93 | 312 | 2984 |
| 1867 | 364 | 178 | 58 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 10 | 614 |
| 1868 | 7 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 13 |
| 1869 | 0 | 0 | 0 | 2 | 5 | 8 | 80 | 226 | 147 | 73 | 16 | 11 | 568 |
| Total... | 2820 | 2866 | 1843 | 960 | 973 | 884 | 2464 | 2875 | 2787 | 2147 | 1377 | 1561 | 23557 |

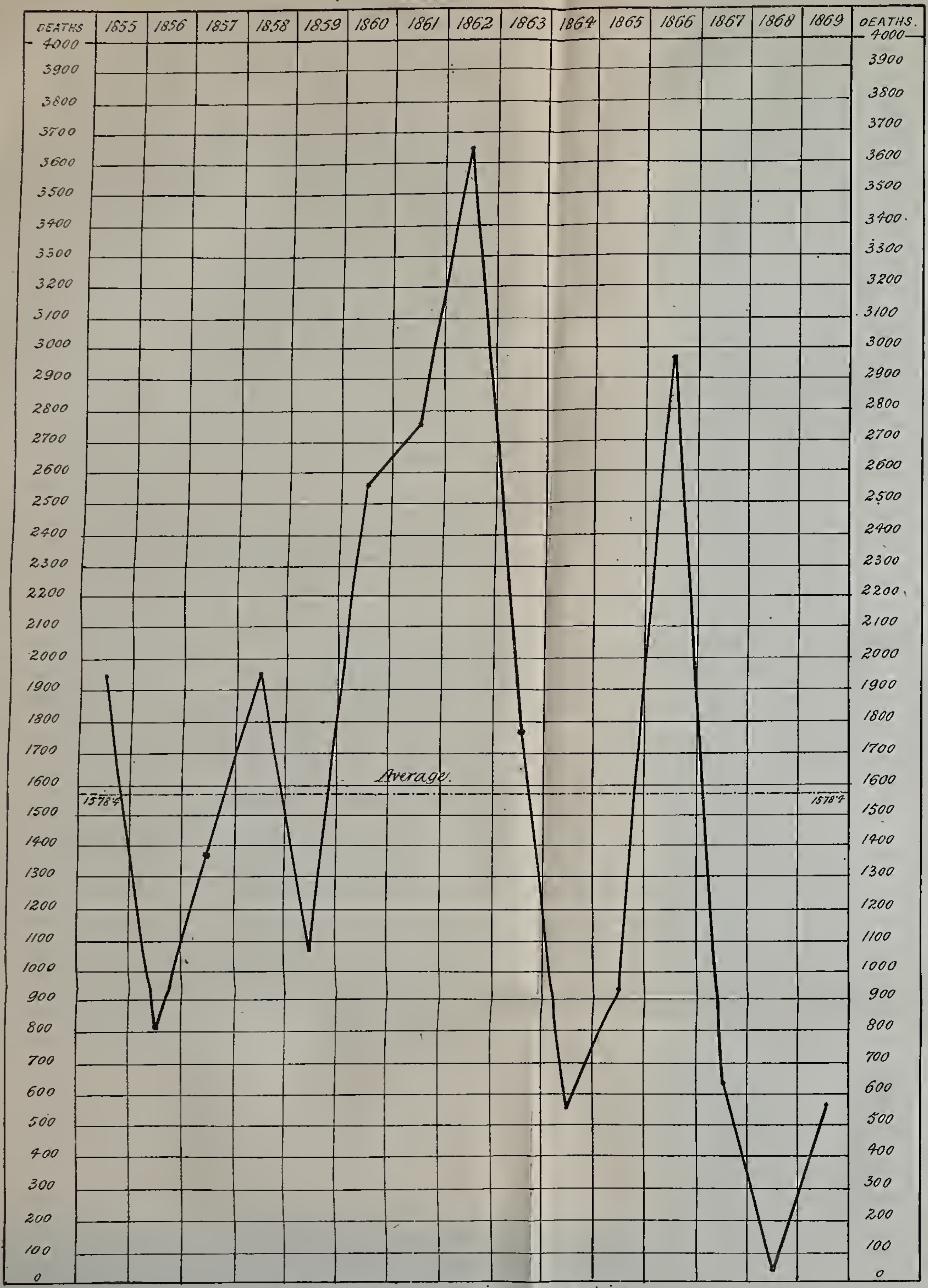
The information here given may be shown in the following diagrams :

# Diagram Showing total Cholera Mortality in Madras for fifteen years, 1855 to 1869.



DRAWN ON TRANSFER BY V. VARDARAJA MOODELY. O.S. COMM$^{R}$ 1870.

# Diagram Showing the Annual Mortality from Cholera in Madras for fifteen years, from 1855 to 1869.



DRAWN ON TRANSFER PAPER BY V.VARDARAJA MOODELY. D.S.COMMISSIONER.

Dr. Cornish, when sending the Table and diagram, which are given in page 83 observed :—

"There are two cholera seasons in Madras—the cholera of the cold " weather, and the cholera of the S. W. monsoon. The cold weather cholera begins to be active after the termination of the N. E. monsoon rains, " when the weather is bright, clear, and cold at nights with the wind from " N. E; N. or N. W. This cold weather cholera begins to decline in " March and with the setting in of the southerly winds about the end of " that month it dies out with great rapidity.—The season in which the " southerly winds blow, from mid March and mid June, is the period of " year in which cholera is at its lowest. These southerly winds come up " pure from the Indian ocean—They have had no terrestrial contamination, and according to my experience, cholera is unable to become epidemic in Madras, while they blow steadily and persistently. These same " winds, however, before they reach the latitude of Calcutta, become a " vehicle for the propagation of cholera. Our period of minimum is Calcutta's maximum of cholera.

" The breezes which are life-giving to Madras are deadly to Calcutta. " In the one case they have blown over hundreds of miles of ocean : in the " other they have blown over a still longer distance of sea, but also some " miles of a moist vapoury and pestilence-breeding soil.

" The southerly winds of Madras are probably fuller of moisture than " the same winds at Calcutta. I dwell on this to show that a moist air " alone will not give rise to cholera. It must be an air which has been in " contact with the earth, or with vapours arising from the earth. Immediately the S. W. monsoon sets in about the middle of June, cholera in " an epidemic form may be looked for, if it should be prevailing in neighbouring districts. The winds in this season only reach Madras after " blowing across the Peninsula. During this transit over the heated " plains of the Carnatic, the monsoon winds lose all, or nearly all, their " moisture, reaching Madras as scorching dry winds. Rain falls at this " season with great irregularity. It is generally scanty in June, but more " marked in July and August. A heavy shower has the effect of cooling " the earth and air temporarily, but the period of the South West monsoon in Madras is one usually of atmospheric heat and dryness, and a " season also when cholera has a great tendency to spread in epidemic " fashion. I notice the point particularly here, because Dr. Bryden has " laid great stress on the element of moist air as a carrier of cholera.

" The South West monsoon where it impinges on the Malabar Coast is " loaded with moisture but, coming up from the sea (which never breeds " cholera) it becomes a vehicle for cholera only after contact with the soil " of an endemic area. Thus the period of the South West monsoon on " the Malabar Coast, is the period of minimum prevalence of cholera in " that locality. In 1859 and 1865 cholera prevailed and badly too in Malabar " all through the monsoon period on the Western Coast but as a " rule all the civil and military Stations on the coast are singularly exempt " during the S. W. winds and rains.

" The general law with reference to the seasonal prevalence of cholera " in Madras I believe to be this: The diffusion of the disease is not so " much a question of moisture in the air, and direction of the wind, as of " the antecedents of the wind. A wind coming straight from the sea can- " not bring cholera to Madras but a land-wind either from the N. or S. W. " is not unfrequently coincident with a development of cholera. The ac- " tual part which the winds play in the diffusion of cholera is a question " that would occupy too much space to enter upon here."

Authors have, however, examined into the connection of atmospheric phenomena with cholera, and the previous pages have established the fact of the seasonal occurrence and of the seasonal rise and fall of cholera and it may be proper, for the assistance of future investigators, to furnish here such meteorological observations as are available:

Table showing the average monthly rain fall at Madras for the 60 years ending 1866, also the monthly rainfall there and monthly deaths from cholera, for the 15 years 1855 to 1869. See Appendix F.

| | Jan. | Feb. | March. | April. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. | Total. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Average monthly Rain-fall for 60 years. | 0·89 | 0·22 | 0·48 | 0·68 | 2·26 | 1·65 | 3·46 | 4·38 | 4·58 | 10·90 | 12·90 | 5·42 | 47·82 |
| Total monthly cholera deaths 1855 to 1869. | 2918 | 2866 | 1843 | 960 | 973 | 884 | 2464 | 2875 | 2787 | 2150 | 1396 | 1561 | 23677 |

| | Jan. | Feb. | March. | April. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. | Total. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Average monthly Rain fall for 15 years 1855 to 1869. | 0·63 | 0·06 | 0·14 | 0·76 | 0·80 | 2·08 | 3·77 | 4·34 | 3·64 | 10·42 | 1047 | 4·99 | 42·14 |
| Total monthly cholera deaths 1855 to 1869. | 2918 | 2866 | 1843 | 960 | 973 | 884 | 2464 | 2875 | 2787 | 2150 | 1396 | 1561 | 23677 |

It will be observed from the above that the severost cholera occurrences in Madras are in two periods of the year, possessing very dissimilar physical characters. There are seven months in which cholera deaths in Madras are above the monthly average of 1578. The December's amount, viz. 1561, is quite close to the average, and that month with January, February and March may be styled the cool dry weather. But July to October, in all of which months the avorage is exceeded, is decidedly hot and dry or hot and humid. The present statistical information available does not warrant further remark than that in the past fifteen years cholera has occurred in Madras in every month of the year : that it swells twice, the two distinct rises being in the cool dry weather of January to February and during the hot, close, humid, dead atmospheres of July to October : and that there is a distinct abatement of the ailment in the hot, arid months of April May and June and another fall in tho rainy month of November.

Madras cholera deaths, 15 years, 1855 to 1869.
Total deaths......... .......23677
Average monthly deaths....1578

| Months with deaths above the average : | Months with deaths under the average. |
|---|---|
| Jan... ... ...2918 | April... ......960 |
| Feb..........2866 | May... ......973 |
| March ..,....1843 | June... ......884 |
| July... .....2464 | Nov. ... ...1396 |
| Aug... ......2875 | Dec... ......1561 |
| Sept... ......2787 | |
| Oct... ......2160 | |

If we now examine tho second diagram, in which are shown the annual numbers of deaths in Madras from cholera, rises and falls are observed in it, but, as was remarked at page 51, destitute of any such regularity of sequence as would justify a belief that there is at Madras a periodicity in the recurrence of out-breaks of this disease.

We may now turn to Bombay. Colonel Sabine has minutely examined the meteorology of Bombay, and he read a paper on it before the British Association at the meeting of 1845. In it, as he observes, with regard to the annual variations which are shown in the subjoined table, " we perceive that the leading features of the phenomena are

" clearly analogous to those which present themselves at Toronto, " Prague, and Greenwich ; viz. a correspondence of the maximum of " vapour-pressure and a minimum of gaseous-pressure with the maximum " of temperature ; and of the minimum of vapour-pressure and maximum " of gaseous-pressure with the minimum of temperature ; and a pro- " gressive march of the three variations from the minimum to the max- " imum, and back to the minimum again. The epochs, or turning " points, of the respective phenomena are not in every case strictly iden- " tical ; but their connexion, which is the subject immediately before us, " is most obvious.

" We have thus, he adds, a further illustration of the universality of " the principle of the dependence of the regular periodical variations, an- " nual as well as diurnal, of the pressure of the dry air and of the vapour " on those of the temperature.

| 1843. | Total Cholera deaths. | Temperature. | Vapour-Pressure. | Gaseous-Pressure. | Barometer. | Humidity. | Monthly Means greater (+) or less (—) than the Annual Means. | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Temperature | Vapour Pressure. | Gaseous Pressure. |
| | ‡ | Deg. | Deg. | Inch. | Inch. | | Deg. | Inch | Inch. |
| January | 5463 | 76·4* | 0·578* | 29 352 | 29 930 | 67 | —4·7 | —0·202 | +0·329 |
| February | 3415 | 77·7 | 0·648 | 29·246 | 29·894 | 71 | —3 4 | —0·132 | +0 223 |
| March | 4074 | 79·7 | 0·710 | 29·128 | 29·838 | 74 | —1·4 | —0·070 | +0·105 |
| April | 5056 | 84·2 | 0·853 | 28·961 | 29·814 | 76 | +3·1 | +0·073 | —0·062 |
| May | 4715 | 85·9† | 0·921 | 28·743 | 29·664 | 78 | +4·8 | +0·141 | —0·280 |
| June | 4456 | 85·4 | 0·935† | 28·718* | 29·653 | 80 | +4·3 | +0·155 | —0·305 |
| July | 2756 | 82·1 | 0·896 | 28·737 | 29·633* | 85 | +1·0 | +0·116 | —0·286 |
| August | 1872 | 81·2 | 0·859 | 28·869 | 29·728 | 84 | +0·1 | +0 079 | —0·154 |
| September | 1741 | 81·1 | 0·859 | 28·920 | 29·779 | 84 | 0·0 | +0·079 | —0·103 |
| October | 1570 | 82·2 | 0·819 | 29·026 | 29·845 | 78 | +1·1 | +0·039 | +0·033 |
| November | 1741 | 80·5 | 0·675 | 29·213 | 29·888 | 67 | —0·6 | —0·105 | +0·190 |
| December | 3586 | 76·6 | 0·592 | 29·368† | 29·960† | 67 | —4·5 | —0·188 | +0·345 |
| Total | 40445 | | | | | | | | |
| Mean | ... | 81·1 | 0·780 | 29·023 | 29·803 | 76 | | | |

" The humidity exhibits also a single progression ; but may, perhaps, be " rather characterized as evidencing a very dry season from November to " February, and a very humid one from June to September, the latter sea- " son being that of the rains.

" The average degree of humidity in the year is very slightly lower than " either at Toronto or at Greenwich, but is still closely approaching to a

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* Signifies 'minimum.' † Signifies 'maximum.'

‡ This column has been added by me, to the columns given by Colonel Sabine, to facilitate the examination of the subject. E. B.

" value expressing the pressure of three-fourths of the quantity of vapour " required for saturation."

With reference to Colonel Sabine's remarks on his tabular statement (side by side of which I have placed the monthly cholera deaths) it may be remarked that, in Bombay, in the 18 years 1848 to 1865, there died from cholera 40,445 people, and, in that period, every one of the twelve months had cholera. But, in the five months July to November, cholera has been, of all the year, the least prevalent, for in them the number of deaths continued below the monthly average. In four of these months the temperature was equal to or above the annual mean and in the four months vapour pressure was above the annual mean. In the December's the numbers of cholera deaths increased above the monthly average and continued at a high rate up to the end of June, all through the dry cool and dry hot months of the year when land and sea breezes blow, and into the first rains. These points can be shown by the marginal statement ; and the diminution of the number of cholera deaths in the very humid months July to November, merits notice ; because, at Madras, there was a fall from 2150 deaths in the October's to 1396 in the heavy monsoon November months again to increase to 1561 in the drier Decembers and to continue above the average in all the cool dry weather till the end of March. But there seems no other point of resemblance, between Madras and Bombay.

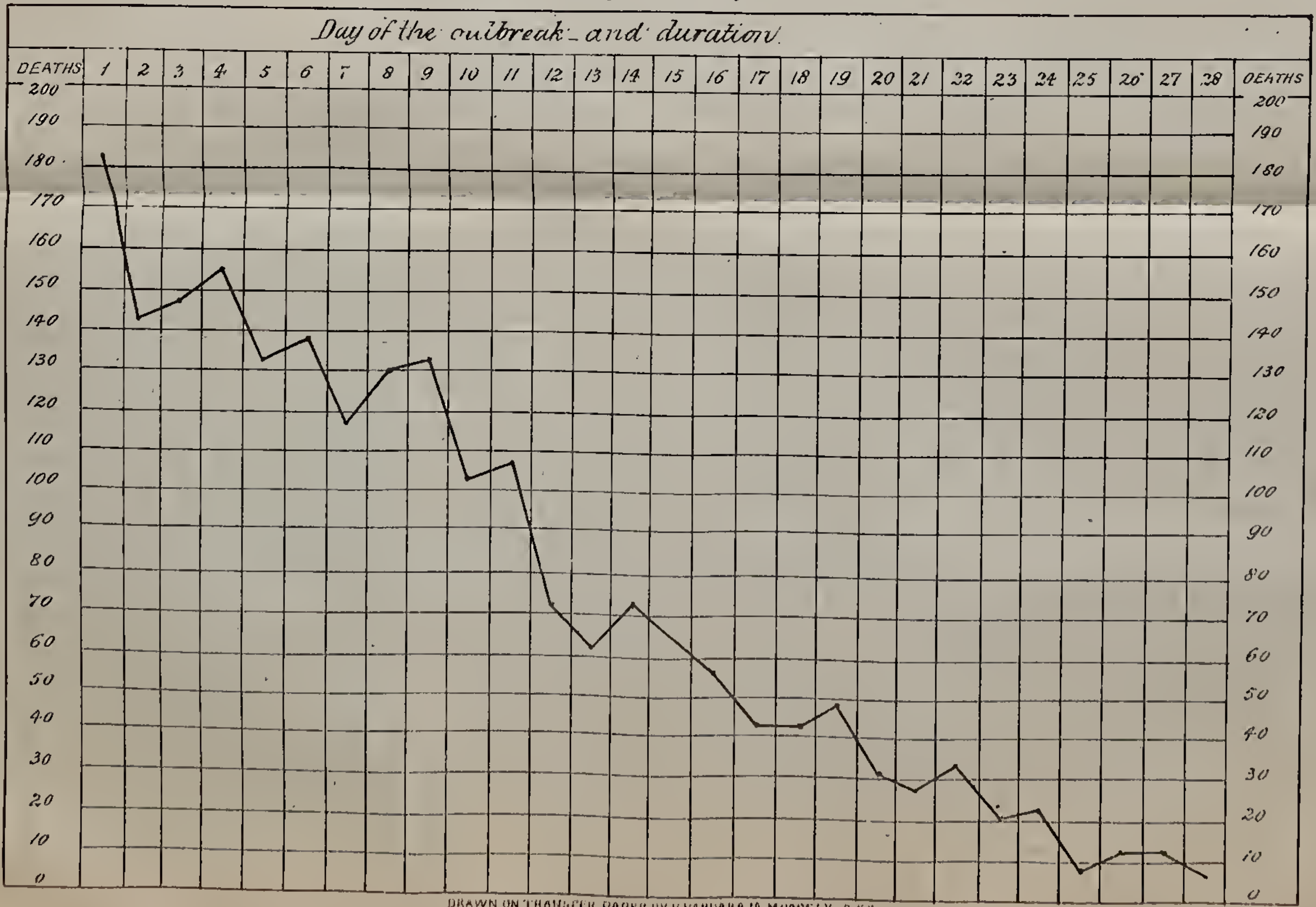
Bombay cholera deaths in the 18 years, 1848 to 1865.

| | |
|---|---|
| Total deaths | 40.445 |
| Average monthly deaths | 3370 |
| December | 35[illegible]6 |
| January | 5463 |
| February | 3415 |
| March | 4074 |
| April | 5056 |
| May | 4715 |
| June | 4456 |
| Average 3370. | |
| July | 2756 |
| August | 1872 |
| September | 1741 |
| October | 1570 |
| November | 1741 |

It is a prevailing belief that when cholera first invades a locality or appears as an epidemic amongst bodies of soldiers, there are at first a few scattered cases, of little severity ; then many severe cases occur and the out-break thereafter begins to decline. In the Madras Native Army this was the usual course when it broke out amongst marching corps and at page 77, it was remarked on the examination of a tabular statement given by Dr. Lorimer that " this disease, when it assumes an epi-" demic form, presents three stages, viz : 1st that of its accession, which " lasts four or five days, during which the cases that occur are few in num-" ber and of little severity ; 2nd the virulent stage then commences, and " lasts for 8 or 9 days, during which numerous cases occur ; 3rd the "disease then declines in frequency, and within the next ten days, it "disappears, the average duration of the epidemic being only 24 days." By a tabular statement furnished by Dr. Bryden, of 104 cholera epidemics amongst European soldiers, a summary of which I have given at page 79, it is shown that the cases were most numerous on the first day of the out-break and that the disease disappeared from the 28th day ; The features of the Bengal epidemics amongst Europeans are shown in Diagram No. 3, and the cases will be observed to be most numerous on the first day of the out-break, and to decrease from the first to the 28th day by almost equal daily falls. There are rises every second day, but the successive rises are less than the previous and subsequent falls. As this is the result of the examination of the great number of 104 cholera outbreaks, amongst the European soldiers of the Bengal Army, such large decreasings with slighter rises may be regarded as a law, there, in the action of the agent causing out-breaks of this disease.

No. 3

## Diagram Showing the Subsidence of 104 Cholera outbreaks amongst the European Soldiers of the Bengal Army for the 11 years 1856 to 1866.



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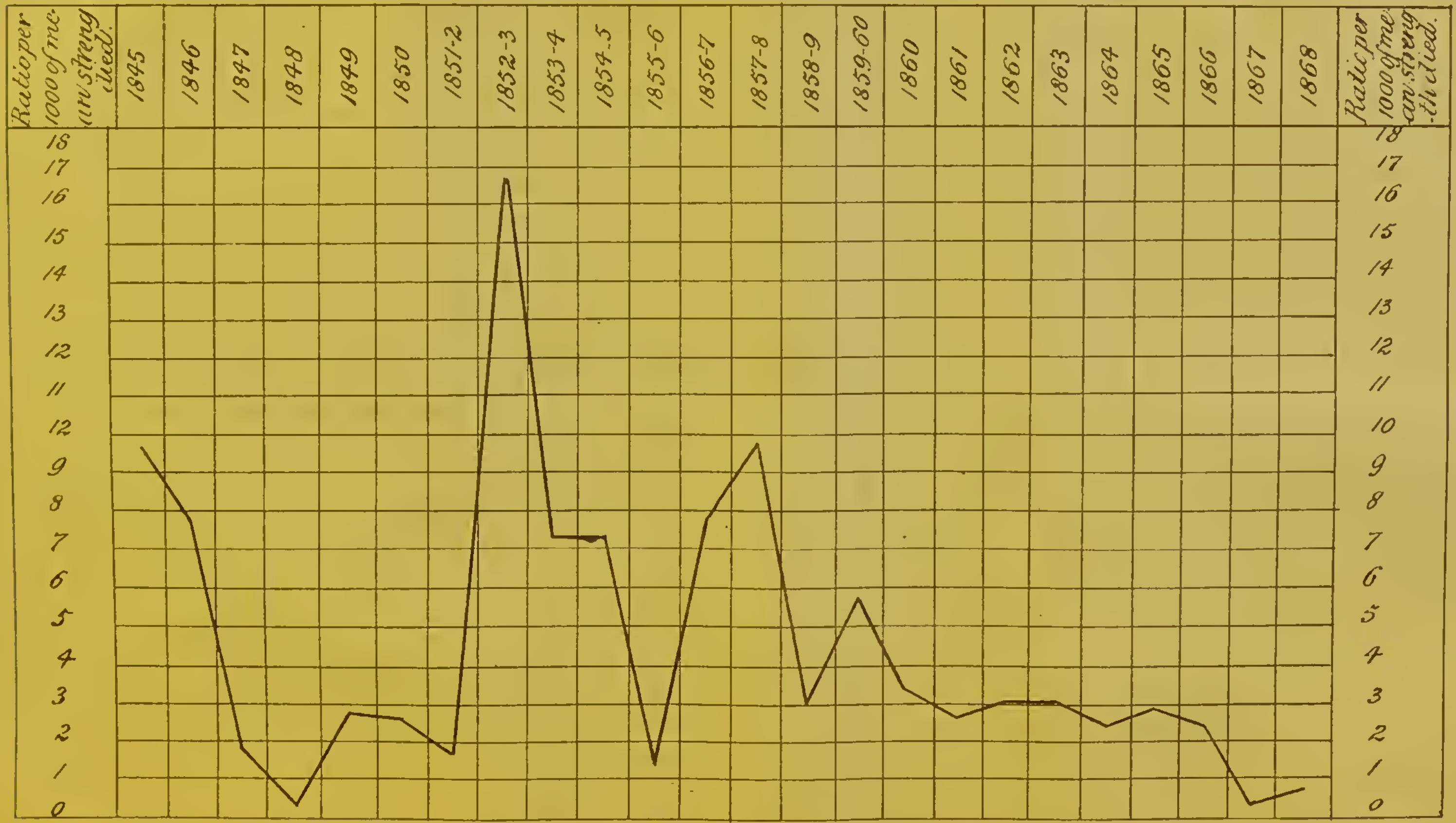
At page 5 it was remarked how "continuous this disease had been in Madras, diminishing in some years and increasing in others without any apparent sequence. But in the European army of Bengal, in the years 1843 to 1846-7 the rate of Cholera deaths per 1000 of the strength was 13·5. The next two years, the rate was 4·8 and 6·7 and then, in 1849-1850, it rose to 12·6 per 1000. Two years of great quiescence were followed in 1852-3 and 1853-4 by the high rates of 12·4 and 11·9. Then again there followed two years of great quiet, succeeded by six years of activity, during which the rates were 33.05, 9·16, 8·67, 12·04, 23·73 and 9·61 and finally four quiet years were followed in 1867, by a rate of 13·84 per 1000." These two features of the Madras and Bengal cholera are well shown in diagrams 4 and 5: No. 4, for Madras gives no indication of periodicity, but in the European Army of Bengal, in the years 1843 to 1867, there has been a semblance of periodicity, with occasional exacerbations.

No 4.

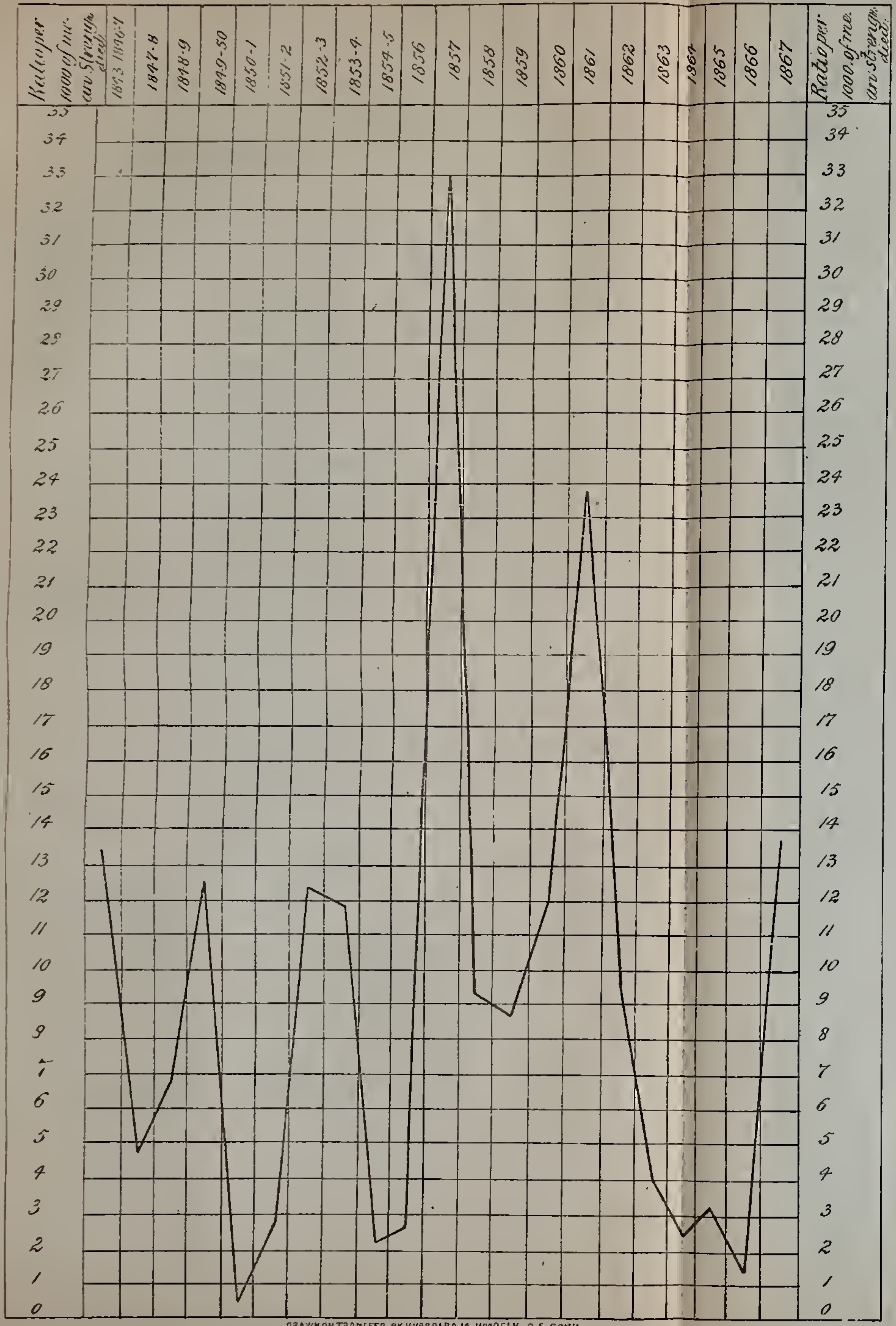
Diagram Showing the Ratio per 1000 of mean Strength of the European Force of the Madras Army that died from Cholera in each of the 24 years from 1845 to 1868.



DRAWN ON TRANSFER BY V. VARDARAJA MOODELY.

No. 5.

Diagram Showing the Ratio per 1000. of mean strength of the European Forces of Bengal Army that died from Cholera in each of the 24 years from 1843 to 1867.



DRAWN ON TRANSFER BY V VARDARAJA MOODELY. O.S. COMY

# Appendix A.

*Notices by European Writers of Morshi, Mordeshin, Mort-de-Chien, or Cholera-Morbus, before* 1817, *chronologically arranged.*

| | | |
|---|---|---|
| Calicut | 1503 | Lendes da India by Gasper Correa |
| Goa (Great epidemic) | 1543 | do do do. |
| Goa | 1563 | Garcia D'Orta. |
| Goa | 1580 | A. Costa. |
| Goa | 1589 | Linschot. |
| Java | 1629 | Bontius. |
| India, Arabia, and Morocco | 1632 | Zacutus Lusitanus. |
| Goa | 1638 | Mandelsloe |
| Boorhampore to Surat | 1666 | De Thevenot. |
| Surat | 1674 | Dr. Fryer. |
| Common in Western India | 1676 | Dellon, |
| Madura and Coromandel Coast | 1703 | Père Martin. |
| Mentioned as a disease in Bengal | 1709 | Père Papien. |
| Mentioned as a disease of India | 1736 | Paxmanu. |
| Tinnevelly | 1747 | Orme. |
| First campaign in Madras country | 1756 | Dr. Paiseley. |
| Near Pondicherry | 1769-71 | Sonnerat. |
| Amberpet and Arcot | do | Madras Report. |
| Bombay | 1772 | Clarke. |
| Trincomalee before | 1774 | Dr. Paiseley. |
| Madras | 1774 | |
| Mauritius | 1775 | Dr. Burke. |
| Malabar Coast | 1778 | Fra Bartolomeo. |
| Coromandel Coast (bad epidemic). | 1776-8 ? | Sonnerat. |
| In East Indies | 1780 | Lind. |
| Ganjam, Calcutta, Sylhet (epidemic) | 1781 | C. Wilkins, Jameson.<br>W. Hastings, Lindsay. |
| Madras, Trincomallee | 1782 | Curtis, Girdlestone. |
| Tranquebar | do | Konig. |
| Malabar Coast (epidemic) | do | Fra Bartolomeo. |
| Bombay | do | Clarke. |
| Along the whole Madras Coast | 1783 | Madras Report. |

| | | |
|---|---|---|
| In Travancore country | 1783 | Hay, M. R. |
| Great out-break at Hurdwar | do | Bengal Report. |
| Vollore and Arcot | 1787,8,9 | Madras Report. |
| Ganjam | 1790 | Bengal Report. |
| Malabar Coast, ever since | do | Dr. Macrae. |
| Travancore | 1792 | Hay M. R. |
| Backergunge | 1797 | Taylor, Topog. of Dacca. |
| Trincomalee | 1804 | J. Johnson. |
| At various stations in Bengal | 1808,9,11,12,13,14 | Records of Bengal Medical Board. |
| Jaulnah | 1814 | Madras Report. |
| Purneah | 1816 | Calcutta newspaper. |
| Kishnaghur and Mymensing, May and June | 1817 | Bengal Report. |
| Jessore, August | 1817 | do do |

*Notices of Cholera not fully verified.*

| | | |
|---|---|---|
| Aurungzebe's army at Beejapore | 1689 | Khafee Khan. |
| Nadir Shah's army | 1735 | mere Native Reports. |
| Epidemic, with sudden deaths near Tinnevelly | 1747 | Orme, Vol. II p. 201. |
| Arcot | 1756-7 | French Writers. |
| Bengal | 1762 | French Writers, disproved from Lind. |
| Bundelkund | 1780 | Bengal Report. |
| General Andree's army | 1781 | French Writers. |
| Mahratta Country | 1790 | Mr. Tuke in Bombay Report. |

The above is taken from Dr. John Macpherson's "Cholera in the East," pamphlet, London, 1869.

## Appendix B.

*Names for Cholera.*

1 Alm Maida, Arab.
Haiza or Haida, Arab.
Marad-ul-aswad, Arab. or Marz-ul-aswad, Arab.
Halgi ; also, Palki ; also Rog, Bhaka.
5 Ola Utha, Bengalee ; Ultha-Dast, Bengalee.

Wati bedi, Canarese.
Dakee, Cashmeree.
Voit, Concan.
Cholera, Cholera-Morbus ; Malignant Cholera ; sporadic, endemic or spasmodic Cholera ; Epidemic Cholera, English.
10 Mort-de-Chien, Choleéree : Choleraggie ; Trousse galant : French.
Brech-ruhr : Die Gallen ruhr, German.
Hagok, Guzeratee.
Koganla, Guzeratee.
Ukhal Julab, do
15 Waba, Ar. Hind. of Dekhan.
Kai Julab, Hind. do. do.
Wakal Julab, do. do. do.
Bara lagna, do. do. do. (literally the wind to strike.)
Gharbar hona, do. do. do. (literally creating a disturbance.)
20 Dank lagna, do. do. do.
Kala Marri, Hind. of Hindustan.
Uparwai tarwai do. do.
Cholera : Cholera-Morbus : Passio Cholerica ; Diarrhœa Cholerica ; Latin.
Modshi, Mahr, provincially Modavasl and said to be corrupted into " Mordshi" " Mordeshim," " Mort-de-Chien," " Mordexym," " Morxi" " Mordeshi," " Mordeshin."
25 Morshi, Mahr, of Goa.
Tural, Mahr.
Ukari Julab, Mahr.
Tao of Malwa.
Ukari Julab, Marwaree.
30 Ulti Julab, do.
Marri, do.
Jharoti of Nepal.
Kai Julab, Persian, Hind.
Kai Dast, do. do.
35 Bad Howai, do. do. (literally, bad air).
Visu chika, Sanse. ,, ,,
Mari, do.
Churdie Rogam, do. ? ?
Uri Katha, Tam.
40 Ennerum Vandi, Tam ? Kasapoo, Tam. Doom, Tam.
Wandi Bedi, Tam, Tel.
Wanti Bedeo, Tel.

Several of the above names are given in Dr. J. Macpherson's pamphlet " Cholera in the East." A few of the names, Nos. 4,8,12,13,22,24,26, and 36 need to be examined.

## Appendix C.

*Return showing the mortality from Cholera and other causes in the several Collectorates of the Madras Presidency for the years* 1866-1867 and 1868.

| Districts. | 1866. | | | | 1867. | | | | 1868. | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Population. | Cholera. | Other Diseases. | All Diseases. | Population. | Cholera. | Other Diseases. | All Diseases. | Population. | Cholera. | Other Diseases. | All Diseases. |
| Ganjam ... .. | 702,239 | 15,549 | 23,313 | 38,862 | 11,82,349 | 548 | 14,163 | 14,711 | 12,27,757 | 207 | 14,343 | 14,540 |
| ,, Zemindary ... | 314,026 | 9,380 | 8,587 | 17,967 | | | | | | | | |
| Vizagapatam ... .. | 798,877 | 11,695 | 17,510 | 29,205 | 14,24,652 | 145 | 15,504 | 15,649 | 15,03,164 | 121 | 18,488 | 18,609 |
| Godavery ... ... | 779,902 | 7,560 | 14,198 | 21,758 | 1,401,762 | 575 | 24,399 | 24,974 | 14,23,436 | 9 | 20,554 | 20,563 |
| ,, Zemindary .. | 594,724 | 8,712 | 11,738 | 20,450 | | | | | | | | |
| Kistna ... .. | 792,744 | 5,591 | 18,478 | 24,069 | 726,398 | 3,700 | 18,341 | 22,041 | 11,27,075 | 21 | 19,685 | 19,706 |
| Nellore ... .. | 613,899 | 1,884 | 12,927 | 14,811 | 1,060,932 | 1,090 | 15,082 | 16,172 | 11 61,442 | 6 | 18,676 | 18,682 |
| ,, Zemindary .. | 365,838 | 3,790 | 7,331 | 11,121 | | | | | | | | |
| Cuddapah ... . | 1,040,878 | 14,823 | 18,251 | 33,074 | 1,091,920 | 323 | 13,270 | 13,593 | 10,92,266 | 14 | 18,289 | 18,303 |
| Bellary ... .. ... | 1,210,316 | 22,833 | 27,452 | 50,285 | 1,312,705 | 10 | 17,710 | 17,720 | 10,96,235 | 0 | 22,852 | 22,852 |
| Kurnool ... ... ... | 718,865 | 7,685 | 13,716 | 21,401 | 740,614 | 368 | 12,164 | 12,532 | 7,70,728 | 0 | 14,938 | 14.938 |
| Madras .. ... ... | 664,836 | 9,294 | 13,575 | 22,869 | 664,836 | 2,283 | 12,404 | 14,687 | 6,56,945 | 24 | 15.566 | 15,590 |
| North Arcot ... .. | 1,069,685 | 10,475 | 21,472 | 31,947 | 1,147,896 | 2,511 | 19,328 | 21,839 | 17,33 238 | 322 | 30,773 | 31.105 |
| South Arcot .. . | 1,100,266 | 8,932 | 18,259 | 27,191 | 1,172,902 | 4,547 | 14,885 | 19,432 | 9,66,579 | 550 | 13,608 | 14,158 |
| Tanjore ... ... | 1,572,703 | 8,978 | 26,599 | 35,577 | 1,580,602 | 8,394 | 25,155 | 33,549 | 17.19,479 | 2508 | 30,784 | 33,392 |
| Trichinopoly ... ... | 835,887 | 7,168 | 15,501 | 22,669 | 890,673 | 1,639 | 12,868 | 14,507 | 9,98,395 | 2201 | 13,865 | 16,066 |
| Madura ... ... | 1,737,495 | 8,229 | 13,284 | 21,513 | 827,554 | 2,056 | 16,933 | 18 959 | 19,44,010 | 293 | 19,096 | 19,389 |
| Ramnad Zemindary (Madura) | 491,883 | 3,772 | 6,624 | 10,396 | | | | | | | | |
| Tinnevelly ... .. | 1,363,051 | 3,186 | 18,163 | 21,349 | 13,63,051 | 2,254 | 16,123 | 18,377 | 15,24,121 | 94 | 19,116 | 19,210 |
| Coimbatoor .. .. | 1,209,740 | 9,377 | 15,765 | 25,142 | 12,78,482 | 603 | 11,693 | 12,296 | 14,14.252 | 168 | 15.629 | 15,797 |
| Salem ... ... | 1,493,221 | 12,593 | 19,415 | 32,308 | 14 93 221 | 812 | 14.930 | 15,742 | 15,25,945 | 1071 | 17,471 | 18,542 |
| SouthCanara .. ... | 781,767 | 2,429 | 14,388 | 16,817 | 809,150 | 462 | 22,246 | 22,708 | 8,31,927 | 114 | 17,437 | 17,551 |
| Malabar ... ... | 1,716,852 | 4,012 | 31,402 | 35,444 | 17,28,041 | 271 | 29,992 | 30,263 | 18,50,319 | 10 | 29,754 | 29,764 |
| Totals.... | 21,959,694 | 197,977 | 388,248 | 586,225 | 21,897,740 | 32,591 | 327,190 | 359.781 | 245 ,67.323 | 8023 | 370,734 | 378.757 |

NOTE.—In some years population returns from some places, not received. E. B.

# APPENDIX D 1.

*From the Records of the Office of the Inspector General Madras. Obtained 8th September* 1869.

Return showing the Strength of the Madras Army, Europeans and Natives, from 1845 to 1868 inclusive, also the Admissions and Deaths from Cholera and from all other diseases, for the same period :

Europeans.

| Years. | Strength | Cholera. | | Other Diseases. | | All diseases. | | Cholera, Ratio per 100 of mean strength died | From cholera one death in every |
|---|---|---|---|---|---|---|---|---|---|
| | | Ad. | Died | Ad. | Died. | Ad. | Died. | | |
| 1845 | 12,548 | 232 | 124 | 20,164 | 367 | 20,396 | 491 | 9·8 | 1·8 |
| 1846 | 11,113 | 146 | 75 | 16,495 | 327 | 16,641 | 402 | 6·7 | 1·9 |
| 1847 | 11,429 | 32 | 22 | 17,863 | 315 | 17,895 | 337 | 1·9 | 1·4 |
| 1848 | 9,679 | 3 | 2 | 17,287 | 172 | 17,290 | 174 | 0·2 | 1·5 |
| 1849 | 9,559 | 43 | 26 | 15,546 | 219 | 15,589 | 245 | 2·7 | 1·6 |
| 1850-1 | 9,136 | 35 | 21 | 14,611 | 205 | 14,646 | 226 | 2·2 | 1·6 |
| 1851-2 | 9,119 | 25 | 15 | 14,066 | 201 | 14,091 | 216 | 1·6 | 1·6 |
| 1852-3 | 9,170 | 253 | 155 | 16,658 | 323 | 16,911 | 478 | 16·9 | 1·6 |
| 1853-4 | 8,291 | 121 | 61 | 14,732 | 263 | 14,853 | 324 | 7·3 | 1·9 |
| 1854-5 | 9,021 | 131 | 65 | 15,334 | 235 | 15,465 | 300 | 7·2 | 2·0 |
| 1855-6 | 7,599 | 25 | 11 | 12,283 | 189 | 12,308 | 200 | 1·4 | 2·2 |
| 1856-7 | 7,513 | 136 | 58 | 11,390 | 157 | 11,526 | 215 | 7·7 | 2·3 |
| 1857-8 | 9,396 | 245 | 112 | 15,346 | 273 | 15,591 | 385 | 11·9 | 2·1 |
| 1858-9 | 15,482 | 85 | 47 | 29,946 | 608 | 30,031 | 655 | 3·03 | 1·8 |
| 1859-60 | 16,921 | 216 | 99 | ... | ... | ... | ... | 5·8 | 2·1 |
| 1860 | 13,037 | 107 | 42 | 20,306 | 172 | 20,413 | 214 | 3·2 | 2·5 |
| 1 | 14,164 | 77 | 37 | 19,576 | 155 | 19,653 | 192 | 2·6 | 2·0 |
| 2 | 13,096 | 80 | 41 | 17,278 | 167 | 17,358 | 208 | 3·1 | 1·7 |
| 3 | 12,333 | 80 | 39 | 15,314 | 161 | 15,394 | 200 | 3·1 | 2·0 |
| 4 | 12,792 | 98 | 33 | 19,795 | 193 | 19,893 | 226 | 2·5 | 2·9 |
| 5 | 12,675 | 76 | 38 | 18,513 | 220 | 18,589 | 258 | 2·9 | 2·0 |
| 6 | 11,179 | 45 | 28 | 16,238 | 199 | 16,283 | 227 | 2·5 | 1·6 |
| 7 | 10,793 | 12 | 4 | 14,956 | 184 | 14,968 | 188 | 0·3 | 3·0 |
| 8 | 9,934 | 7 | 5 | 13,785 | 157 | 13,792 | 162 | 0·5 | 1·4 |
| Total.. | 265,979 | 2310 | 1,160 | 387,482 | 5,462 | 389,576 | 6,524 | 4·3 | 1·9 |

# APPENDIX D 2.

## NATIVES.

Return showing the strength of the Madras army, Europeans and Natives, from 1845 to 1868, inclusive, also the admissions and deaths from cholera and from all other diseases, for the same period : *from the Records of the Madras Inspector General's Office. Obtained 8th September* 1869.

| Years. | Strength | Cholera. | | Other diseases. | | All diseases. | | Cholera ratio per 1000died | One death from cholera in every |
|---|---|---|---|---|---|---|---|---|---|
| | | Ad· | died. | Ad. | died. | Ad. | died. | | |
| 1845 | 74,861 | 1,718 | 708 | 48,152 | 836 | 49,870 | 1,544 | 9·4 | 2·4 |
| 1846 | 74,682 | 2,699 | 1,208 | 54,550 | 794 | 57,249 | 2,002 | 16·1 | 2·2 |
| 1847 | 67,950 | 234 | 78 | 52,503 | 802 | 52,737 | 880 | 1·1 | 3·0 |
| 1848 | 55,946 | 237 | 93 | 48,011 | 597 | 48,248 | 690 | 1·6 | 2·5 |
| 1849 | 50,030 | 269 | 104 | 43,516 | 506 | 43,785 | 610 | 2·07 | 2·5 |
| 1850-1 | 50,448 | 484 | 183 | 38,803 | 529 | 39,287 | 712 | 3·6 | 2·09 |
| 1851-2 | 49,881 | 461 | 202 | 37,063 | 456 | 37,524 | 658 | 4·04 | 2·2 |
| 1852-3 | 49,747 | 353 | 125 | 49,080 | 614 | 49,433 | 739 | 2·5 | 2·6 |
| 1853-4 | 47,887 | 652 | 284 | 43,055 | 660 | 43,707 | 944 | 5·9 | 2·2 |
| 1854-5 | 46,988 | 461 | 190 | 47,584 | 555 | 48,045 | 745 | 4·04 | 2·4 |
| 1855-6 | 47,938 | 154 | 59 | 44,673 | 631 | 44,827 | 690 | 1·2 | 2·6 |
| 1856-7 | 47,968 | 314 | 141 | 50,185 | 644 | 50,499 | 785 | 2·9 | 2·2 |
| 1857-8 | 47,902 | 432 | 177 | 58,405 | 895 | 58,837 | 1,072 | 3·6 | 2·4 |
| 1858-9 | 57,653 | 451 | 227 | 64,134 | 781 | 64,585 | 1,008 | 3·9 | 1·98 |
| 1859-60 | 60,750 | 691 | 260 | | | | | 4·2 | 2·6 |
| 1860 | 43 458 | 362 | 150 | 41,640 | 482 | 42,002 | 632 | 3·4 | 2·4 |
| 1861 | 37,975 | 163 | 64 | 24,836 | 326 | 24,996 | 390 | 1·6 | 2·5 |
| 1862 | 32,069 | 197 | 84 | 22,083 | 207 | 22,280 | 301 | 2·6 | 2·3 |
| 1863 | 30,505 | 230 | 84 | 20,762 | 203 | 20,992 | 287 | 2·7 | 2·7 |
| 1864 | 28,116 | 291 | 112 | 21,125 | 240 | 21,416 | 352 | 3·9 | 2·5 |
| 1865 | 24,608 | 278 | 133 | 19,685 | 227 | 19,963 | 360 | 5·4 | 2·09 |
| 1866 | 27,217 | 204 | 95 | 21,931 | 247 | 22,135 | 342 | 3·4 | 2·1 |
| 1867 | 29.650 | 43 | 22 | 22,200 | 227 | 22,243 | 249 | 0·7 | 1·95 |
| 1868 | 28,153 | 40 | 18 | 19,885 | 226 | 19,925 | 244 | 0·6 | 2·2 |
| Total... | 1,112,382 | 11,418 | 4,801 | 893 861 | 11,685 | 854,585 | 16,236 | 4·3 | 2·3 |

## Appendix E I.

Commission Vol. II. P. 660.

Table showing the Strength, sickness and deaths in the Madras European Army for 17 years, 1842—1858-9.

EUROPEANS.

| Division. | Aggregate. Strength. | Total Treated. | Total Died. | Deaths from Cholera. | Deaths from other diseases. |
|---|---|---|---|---|---|
| Presidency Division ...... | 17017 | 26324 | 469 | 85 | 384 |
| Centre .................. | 22497 | 35677 | 988 | 212 | 776 |
| Southern.................. | 15670 | 28035 | 455 | 116 | 339 |
| Mysore.................. | 28423 | 39445 | 617 | 159 | 458 |
| Malabar and Canara ........ | 16145 | 24718 | 346 | 17 | 329 |
| Ceded Districts ............ | 12273 | 20752 | 417 | 208 | 209 |
| Hyderabad Sub. Force ..... | 22571 | 41771 | 846 | 56 | 790 |
| Nagpore Force ........... | 9415 | 18282 | 334 | 37 | 297 |
| Northern 12 years 1842 to 1851 and from 1857-8. | 1364 | 1490 | 75 | 2 | 73 |
| Southern Mahratta Division 5 years 1842 to 1846 | 1132 | 2609 | 52 | 12 | 40 |
| Saugor 12 years 1846 to 1857 | 7068 | 14957 | 308 | 15 | 293 |
| Tenasserim Provinces Pegue 6 years from 1852-1857-8.... Amalgamated in 1858-9. | 17816 | 29889 | 789 | 176 | 613 |
| Straits............ | 954 | 1189 | 25 | ,, | 25 |
| Aden 11 years from 1844 to 1854-5 .......... | 2248 | 3530 | 86 | 19 | 67 |
| China ...... 4 years from 1842 to 1845. | 539 | 1846 | 27 | 1 | 26 |
| Labuan .. 4 years from 1852-3 to 1855-6 ... | 47 | 123 | 5 | ,, | 5 |
| Bengal...... Presidency. for 1857-8.... | 1445 | 3023 | 206 | 91 | 115 |
| Scind for 1842 .... ....... | ,, | ,, | ,, | ,, | ,, |
| General Hospital.............. | ,, | ,, | 88 | 11 | 77 |
| Total.. | 176,629 | 293,690 | 6133 | 1217 | 4916 |

# APPENDIX E 2.

Table Showing the Strength, Sickness and deaths in the Madras Native Army during the years 1842—1858-9.

NATIVES.

| Division. | Aggregate Strength. | Total. |  | Deaths From Cholera. | Deaths From other diseases. |
|---|---|---|---|---|---|
|  |  | Treated. | Died. |  |  |
| Presidency | 47114 | 32161 | 843 | 353 | 490 |
| Centre | 63821 | 42710 | 1471 | 397 | 1074 |
| Southern | 88472 | 69383 | 1836 | 1075 | 761 |
| Mysore | 89087 | 71330 | 1636 | 841 | 795 |
| Malabar and Canara | 55018 | 33915 | 568 | 82 | 486 |
| Ceded Districts | 63266 | 48187 | 987 | 498 | 489 |
| Hyderabad Sub. Force | 127052 | 100286 | 1942 | 1028 | 914 |
| Nagpore Force | 79061 | 51731 | 1052 | 322 | 730 |
| Northern Division | 126897 | 119441 | 2421 | 549 | 1872 |
| Southern Mahratta Division | 52668 | 38860 | 892 | 468 | 424 |
| Saugor from 1846 | 63358 | 54451 | 606 | 77 | 529 |
| Tena serim Provinces Pegu from 1852-3 .... Amalgamated in 1858-9 | 73421 | 105211 | 1743 | 172 | 1571 |
| Straits | 24508 | 22288 | 404 | 6 | 398 |
| Aden from 1844 to 1854-5 | 14062 | 9546 | 253 | 30 | 223 |
| China .. 7 years from 1842 to 1847 and 1857-8 | 11880 | 27481 | 1042 | 15 | 1027 |
| Labuan. 10 years from 1848 | 1484 | 4634 | 48 | 1 | 47 |
| Bengal Presidency.. Europeans 4 years for 1848 to 1850-1 and 1857-8. | 10042 | 10727 | 132 | 22 | 110 |
| Scind for 1842 | 162 | 18 | 3 | .. | 3 |
| General Hospital | ... | ... | 253 | 8 | 245 |
| Total... | 991379 | 842360 | 18132 | 5944 | 12188 |

NOTE. In this Tabular Statement there seem to be some misprints from the original document, as printed in the Report of the Royal Commission, as the totals of the columns do not correspond.

E. B.

## APPENDIX F.

Table of the Monthly and Yearly results of the Observations of the Rain Guage, at the Madras Observatory from 1855 to 1869.

| Years. | MONTHS. | | | | | | | | | | | | Total of each year. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | January. | February. | March. | April. | May. | June. | July. | August. | Septr. | October. | Novr. | Decr. | |
| 1855 | 0·94 | 0·68 | 0·26 | 0·07 | — | 1.12 | 2·69 | 1·65 | 3·75 | 10·61 | 1·47 | 9·08 | 32·32 |
| 1856 | — | 0·03 | — | 0.01 | 5·51 | 0·82 | 3·32 | 5·68 | 1·06 | 3·88 | 16·97 | 9·71 | 46·99 |
| 1857 | 0·32 | — | 0·10 | 0·12 | 0·07 | 2·93 | 2·39 | 0·92 | 1·55 | 37·73 | 5·82 | 1·00 | 52·95 |
| 1858 | — | 0·02 | — | 0·83 | 3·03 | 1·63 | 3·08 | 2·11 | 3·61 | 12·07 | 22·12 | — | 48·50 |
| 1859 | 0·62 | — | — | 4·92 | 0·85 | 2·51 | 8·04 | 2·46 | 8·56 | 7·72 | 19·46 | — | 55·14 |
| 1860 | — | — | — | — | — | 1·75 | 2·07 | 2·47 | 4·97 | 14·07 | 2·08 | 0·23 | 27·64 |
| 1861 | — | — | 1·04 | — | 1·28 | 0·66 | 3·18 | 7·88 | 9·25 | 1·54 | 12·32 | 0·04 | 37·19 |
| 1862 | 0·49 | — | 0·01 | — | 0·60 | 3·67 | 4·53 | 4·56 | 3·60 | 8·20 | 5·52 | 7·00 | 38·18 |
| 1863 | 1·95 | — | 0·67 | 5·05 | 0·12 | 1·07 | 7·07 | 3·14 | 3·04 | 17·09 | 2·03 | 13·38 | 54·61 |
| 1864 | — | — | — | 0·23 | 0·03 | 1·95 | 2·20 | 7;32 | 0·83 | 13·76 | 18·48 | 2·43 | 47·23 |
| 1865 | 0·20 | — | — | 0·02 | 0·38 | 1·62 | 2·02 | 7·19 | 1·28 | 5·82 | 17·76 | 5·57 | 41·86 |
| 1866 | — | 0·21 | — | — | 0.08 | 0·56 | 1·47 | 4·17 | 2·47 | 8·70 | 11·93 | 21·80 | 51·39 |
| 1867 | 0·17 | — | — | 0·11 | 0.07 | 1·86 | 1·89 | 6·70 | 2·43 | 3·39 | 7·37 | 0·38 | 24·37 |
| 1868 | 4·77 | 0·03 | — | — | — | 7·19 | 7·50 | 4·50 | 3·66 | 8·28 | 4·98 | 0·52 | 41·43 |
| 1869 | 0·02 | — | 0·04 | 0·12 | — | 1·94 | 5·19 | 4·40 | 4·57 | 3·45 | 8·85 | 3·73 | 32·31 |
| Total... | 9·48 | 0·97 | 2·12 | 11·48 | 12·02 | 31·28 | 56·64 | 65·15 | 54·63 | 156·31 | 157·16 | 74·87 | 632·11 |
| Average | 0·63 | 0·06 | 0·14 | 0.76 | 0·80 | 2·08 | 3·77 | 4·34 | 3·64 | 10·42 | 10·47 | 4·99 | 42·14 |

## THE STATISTICS OF CHOLERA.

*Madras Medical Board to Madras Government in letter dated 9th August No.* 171 *of* 1849.

* * " by Assistant Surgeon Balfour of this establishment, and to state that in the opi-
" nion of the Board, the performance is highly creditable, and testifies to the ability and zeal
" of that officer; it is a paper, in every point of view, well worthy of publication."

*Extract from the Minutes of Consultation of the Right Hon'ble the Governor of Madras in Council dated* 21*st August No.* 3055 *of* 1849.

" Grants authority for printing the work by Assistant Surgeon Balfour submitted
" with the foregoing letter "

* * * " The Right Hon'ble the Governor in Council notices the favorable testimony borne by the Medical Board to Assistant Surgeon Balfour's ability and zeal."

*The Hon'ble the Court of Directors in letter dated 9th April* No. 39 *of* 1850.

" These proceedings have our sanction. We notice with satisfaction the testimony borne to Assistant Surgeon Balfour's zeal and ability."

*Lancet London, April* 20*th* 1850.

* * * " As a contribution to the Statistics of Cholera the pamphlet of Mr. Balfour is
" the most important work that has appeared for a long time."

*Registrar General's Report on Cholera, London* 1852—p. xcix.

" The fact is placed beyond doubt by the Statistical Analyses of Assistant Surgeon
" Balfour. * * * See some good observations on the movement of Troops in the Statistics of
" Cholera by Assistant Surgeon Edward Balfour."

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## THE LOCALITIES IN INDIA EXEMPT FROM CHOLERA,

BY EDWARD BALFOUR, L. R. C. S. E.

MADRAS, 1856.

*From the Witness Edinburgh, Wednesday, December* 3. 1856.

Dr. Balfour, an able Surgeon at Madras has just published a curious volume of Reports on Cholera. He started some years ago a theory that there were many places absolutely exempt from the scourge. Investigation has confirmed this opinion. In Madras. alone there are thousands of villages which have never felt the visitation, though surrounded by infected districts. Minute lists are supplied and each place is to be separately examined. * * *

*From the Friend of India.*

We require, however, further facts and it is to their collection that the attention of Doctors and Statists all over the earth should be directed. One volume of such data has reached our hands. It has been prepared by Dr. Balfour of Madras, one of the Surgeons who show us what the Company's Service under favourable circumstances might become. With an Industry none the less creditable from the sameness of the task, he has hunted up the facts of the case from every Zillah of his own Presidency. Mysore furnishes a most valuable mass of statistics, and even Scinde and the Dekhan contribute a few figures not without their value. We have not space or indeed time to condense the mass of tables furnished by Dr. Balfour, but * * * the enquiry is of the highest importance and the Madras Government would confer a benefit on humanity by enabling Dr. Balfour to devote himself to this especial end.

*From the Fort St. George, Gazette, No.* 3055, *Dated* 5*th September* 1856 *p.* 339. *The following Notification is published for the information to the Authorities concerned:*

NOTIFICATION.

Deeming the investigation into the remote and proximate causes of Cholera, upon which Dr. Balfour is engaged, to be one of great interest and importance, the Right Honorable the Governor in Council is pleased to direct that all Civil, Political, Military and Medical authorities will afford to that Officer every assistance in their power, and supply him with such information as he may seek in the prosecution of his enquiries. By Order of the Right Honorable the Governor in Council. (Signed) T. PYCROFT, *Chief Secretary.*

### *From the Bombay Times.*

A very interesting work has just been published by Dr. Balfour of the Madras Army, on the Localities in India exempt from Cholera, and this forms an element for an addition to our physical Atlases, we were not prepared for. A set of cholera or pestilence maps for India * * * would bring under the eye at once in graphic form the vast mass of facts here appearing as statistics. * * Dr. Balfour does not confine himself to dry Tables or abstracts; but gives in his narrative an account of the geological and other leading features of the country. * * The work is one of the many Dr. Balfour has given to the world where the mass of printed matter affords a very inadequate idea of the amount of labour expended on its preparation for the press, or the very great value of the facts comprised within the narrowest limits that can be assigned to them.

### *Madras Quarterly Journal of Medical Science, No. VI, October* 1861, *p.* 423.

" Some years since, Mr. Balfour of the Madras Medical Service, collected a great amount of information shewing the localities exempted from cholera. So far as we are aware he did not attempt to theories on the causes of exemption. His investigations went to prove that certain localities, and most of these were unimportant villages, out of the way of trunk roads, and uncontaminated by the stream of human intercourse, had never been visited by epidemic cholera, and that a few localities subjected to the influences of contagion, were notorious for their exemption from its epidemic visitations." * * We think it is to be regretted that the line of investigation here indicated, has not been followed up with more perseverance, because we are of opinion that it is the only method of proceeding, calculated to throw any light upon the true nature of the cholera poison, and the conditions under which it attains the virulence, such as the unhappy experience of the last few months, has made us familiar with.

---

# CYCLOPÆDIA OF INDIA AND OF EASTERN AND SOUTHERN ASIA, COMMERCIAL INDUSTRIAL AND SCIENTIFIC, PRODUCTS OF THE MINERAL, VEGETABLE AND ANIMAL KINGDOMS, USEFUL ARTS AND MANUFACTURES.

EDITED, BY EDWARD BALFOUR, L. R. C. S. E. SURGEON MADRAS ARMY.

### *Extract from the Minutes of Consultation of the Right Honorable the Governor in Council Madras,* 18*th June No.* 812 *of* 1857.

" The work offers to supply much useful information and is, in the opinion of Government, worthy of encouragement."

### *Madras Journal of Literature and Science, of the Madras Literary Society and Auxiliary Royal Asiatic Society,* 314, *New Ser. Vol. II No. VI. Old Series Vol. XVIII No.* 43.

" The Library of the Society has been furnished by Government with a copy of the Cyclopædia of India and Eastern Asia, By Edward Balfour L. R. C. S. E, Surgeon, Madras Army. * * *

" There is no question but that his long residence in India, his Scientific researches and his very variety of duties eminently fit him for a work of this character, which, however imperfect and incomplete as a whole, will be of great utility and prove a valuable aid to others."

### *The Athenæum, Madras, Thursday April* 1*st* 1858.

**Balfour's Cyclopædia.** " This is unquestionably one of the most important works that have hitherto been published in India. * * * Few men in India are more likely to do justice to such an undertaking. * * *

### *Calcutta Review Vol. XXX, March* 1858 *No. LIX.*

* We have no hesitation in saying that concealed in the soil of India, there are treasures a thousand fold more precious than all the gold and diamonds her mines have hitherto supplied, * * and the man who effectually aids in developing these treasures must be considered a benefactor to our race. Now, such a benefactor, the laborious and accomplished compiler of the work before us, must be acknowledged by all to be. * * p. 83.

" We believe it to be the first work of the kind in India and the projecting of it must have been the result of a happy thought" p. 36. * * " Mr. Balfour's Official connection with it has placed him in the very focus of information on all points relating to the products, the Arts and Manufactures of India." (p. 37.)

The work may be considered a national one. (p. 43.)

This Cyclopædia, collecting, as it does into one convenient repository, the varied informa-ation scattered piece-meal over a thousand works. (p 51 )

But we must take leave of Mr. Balfour and his work, and in doing so we would tender him our hearty thanks for the abundant information he has provided us and express at the same time our sense of the deep obligations under which he has laid the public. p. 65.

*Bombay Standard, Saturday May* 1*st* 1858.

* * * Madras took up a similar set of subjects long after Bombay, but the benighted entrusted the work to individual hands, and the results are before the world. A museum crowded by tens of thousands monthly has nearly now for four years been open. The Madras people have had, if we mistake not, three spleudid exhibitions. The greatest of their triumphs is now before us in a work we casually mentioned about a month ago. " Balfour's Cyclopædia of India and of Eastern and Southern Asia," * * it is a wonderful monument to the talent, learning and industry of Dr. Balfour. * *

*The Morning Post, London, June* 21*st* 1858.

Dr. Edward Balfour's Encyclopædia of Indian Products * * is a work of great merit and infinite labour * * affords an amount of information on Indian Products hitherto unknown. * *

*The Indian Field, Calcutta Saturday, September* 18*th* 1858.

* * A Cyclopædia of India and of Eastern and Southern Asia, treating on the products of the Mineral, Vegetable and Animal Kingdoms, useful Arts and manufactures, under the editorship of Dr. Edward Balfour of the Madras Medical Establishment. A work like this has long been a *desideratum*. * * * Dr. Balfour having undertaken it, and carried it through the press has laid many under obligation in various walks of life; for, when well known, it cannot fail to be appreciated by the botanist, the zoologist, merchant, manufacturer, agriculturist and the student of science, all of whom will be glad to resort to its pages for the amount of reliable information it affords on the multifarious subjects included therein.

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## THE INFLUENCE EXERCISED BY TREES ON THE CLIMATE AND PRODUCTIVENESS OF A COUNTRY;

BY EDWARD BALFOUR, L. R. C. S. E.,
MADRAS, 1848, 8vo.

FROM SIR HENRY CONYNGHAM MONTGOMERY, BART., *Secretary to Government Fort St. George, Revenue Department, Fort St. George,* 8*th September, No.* 982 *of* 1848.

To E. G. BALFOUR, ESQ., *Assistant Surgeon,*

SIR,—I am directed by the Right Honorable the Governor in Council to acknowledge the receipt of your letter dated 31st March 1848, transmitting copy of Notes taken by you on the 'Effect of Trees on the Climate and Productiveness of a Country.' The Right Honorable the Governor in Council has perused with much pleasure and satisfaction the valuable and very interesting information contained in this paper, and in transmitting for your information the resolution passed on the occasion, desires to convey the thanks of this Government for your communication. (Signed) H. C. MONTGOMERY, *Secretary to Government.*

*Revenue Department, No.* 981, *Extract from the Minutes of Consultation under date the* 8*th September* 1848. *Read the following letter from Assistant Surgeon Edward Balfour.* (*Here enter* 31*st March No.* 701, 1848.)

Para 1. The Right Honorable the Governor in Council has perused with much pleasure and satisfaction the valuable and very interesting report furnished by Assistant Surgeon Balfour on the "Effect of Trees on the Climate and Productiveness of a Country," and deeming it of importance that the Local Revenue Officers should be in possession of information so intimately connected with the welfare of the Districts under their respective charges, he resolves to direct that copies of the same be printed at the Fort St. George Gazette Press for general distribution and for transmission to the Government of India and the Government of Bengal, Bombay, and Agra, and the Honorable the Court of Directors. * * * * The Governor in Council resolves to furnish to Assistant Surgeon Balfour a copy of the foregoing proceeding and to convey to him at the same time the thanks of Government for his interesting communication.

(Signed) H. C. Montgomery, *Secretary to Government.*

### *Letter from Major (now Colonel) REID, C. B., Secretary to the Madras Agri-Horticultural Society ; To the Secretary to the Board of Revenue.*

3. The Committee are happy to have it in their power to forward a very ably written paper on this subject (*vide Printed Report already before the Government of India*) from the pen of Assistant Surgeon Edward Balfour of the 5th Regiment N. I. This document was originally intended by Mr. Balfour to have been sent direct to Government; but; changing his mind, he forwarded it to the Secretary of the Horticultural Society to be finally sent through them to its original destination. The Committee would beg the Board to bring this document to the especial notice of Government. * * * (Signed) F. A Reid, *Secretary.*

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## ELEGANTLY PRINTED IN ARABESQUE.

## THE GOOLDUSTEH-I-SOOHN, BEING SELECTIONS FROM THE PERSIAN AND HINDUSTANI POETS, MADRAS, 1851.

BY EDWARD BALFOUR, L. R. C. S E.,

### *From Madras Athenæum, January,* 16.

We have received a grateful present of a curious and pretty book. It is a collection of passages from the Hindostanee and Persian poets all in the Persian character, so long and so universally admired for its great beauty, and engraved on richly ornamented pages. The origin of this fine volume is due to Dr. Balfour the Government Agent at Chepauk. Having for some years past, employed his leisure hours in collecting what appeared to him to be the finest passages in Eastern poetry, Dr. Balfour resolved to have the collection published in an Eastern style. He therefore gave copies of the verses which he had gathered to the Mussulman Syed Hoosain, known as "Koosh Navees," or "the beautiful writer," by whom they were copied into the elegant and flowing hand writing of Persia. The whole work lithographed by the Hakeem Syed Mahomed consists of two hundred and fifty-two octavo pages, luxuriantly ornamented by two Hindoos, Rung Rajoo and Wakand Rajoo, after Mussulman fashion, with designs of flowers and fruits, and such other illustrations as a follower of the Arabian Prophet—forbidden to draw the likeness of any living creature, for fear of furnishing a hint or seduction to idolatry,—may indulge his pencil in pourtraying. Each page has its own distinct design, and both the position and the space occupied by the writing, are regulated by the form and profuseness of these fanciful and beautiful illustrations. We have here then a pure specimen of Eastern ornamental writing, the designs being left to the taste of the writer and the ornamentors, lithographed by a mussulman and bound up after mussulman fashion. The title of the work is Gool-Dusteh-i-Soohn, or "the Bouquet of Language." We learn that parties desirous of possessing themselves of copies of this volume which is valuable both as a great curiosity and on account of its real merits as a work of art, will have an opportunity of supplying themselves at the *Athenæum* Office.

### *From the Madras United Service Gazette, January* 17.

We have been favoured by Dr. Balfour with a copy of his Selections from the Persian and Hindostani poets, being a collection of the finest passages in Eastern Poetry, compiled by this accomplished Orientalist in the course of his reading, and now published in a volume appropriately entitled Gooldusta-i-Sukhoon or the "Persian Anthology." The work does infinite credit to Dr. Balfour's taste as an Oriental Scholar. It is in the Persian character from the pen of Syed Husseiyn ; known as "Khoosh Navees," lithographed by Syed Mahomed, the pages richly ornamented with Arabesques of infinitely varied design, and appropriately bound in the Mahomedan fashion. To Oriental Students we commend this volume of "Elegant Extracts," as such in the truest sense of the word, and acquaint them that it is procurable at the *Athenæum* Library.

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## CONQUEST'S OUTLINES OF MIDWIFERY, IN DIGLOT HINDUSTANI AND ENGLISH, MADRAS, 1850.

BY EDWARD BALFOUR, L. R. C. S. E.

*Extract from the Minutes of Consultation, dated* 13*th June, No.* 500 *of* 1850. *Read the following letter from the Secretary to the Medical Board. Here enter* 4*th May* 1850.

Para 1. The Right Honorable the Governor in Council observes that very favourable testimony is borne, both by the Council of Education in Bengal and by the Principal of the Delhi College to the merits of Dr. Balfour's translation into Hindustani of Dr Conquest's Outlines of Midwifery and * * * it is a work calculated to promote the extension of much useful knowledge among Hindustani students in an important branch of the Medical Department. * * * True Extract. (Signed) H. C. MONTGOMERY, *Chief Secretary.*

*From the Secretary Council of Education* (*Bengal*) ; *To J. P. GRANT Esq., Secretary Government of Bengal, Fort William,* 1*st December* 1849.

2. The Council are of opinion that the work would be most valuable to the Hindustani students of the Medical College and to the Native Doctors generally throughout the country, and beg strongly to recommend that it be published upon the terms mentioned by Dr Balfour.

5. The Council are of opinion that great credit is due to Dr. Balfour for the ability with which he has executed a very difficult task. The diffusion of sound principles connected with the practical departments of medicine cannot fail to be most useful when made known in a vernacular language current among so large a portion of the population of Hindustan. All such attempts to be useful as that of Dr. Balfour are therefore deemed by the Council to be most deserving the patronage and encouragement of the Government of India. *Vide letter from the Secretary to the Council of Education of Bengal to the Secretary to the Government Bengal, dated* 1*st December* 1849.

*Letter From Dr. A. Sprenger, Principal of the Delhi College to the Secretary to the Council of Education of Bengal, dated* 18*th October* 1849.

"Considering that this is the first attempt of translating a work on Midwifery into Oordoo, the manner in which it is executed reflects the highest credit on Dr. Balfour. It is every where intelligible and many passages are elegant as far as the subject admits, and every friend of Native Education will be delighted to see so useful a book published."

*From Dr. F. J. Mouat, Secretary Council of Education, To J. P. GRANT, Esq., Secretary to the Government of Bengal, Fort William,* 4*th February, No.* 238 *of* 1850.

The difficulty of procuring such works may be estimated from the fact that although they have for some years been sanctioned by Government the only one in progress is the Manual of Anatomy by Dr. Mouat: a mere fragment of the Treatise on Medicine and Surgery having been prepared at Delhi. (Signed) F. J. MOUAT M. D. *Secretary Council of Education.*

*From the Medical Board, Madras, in Letter from Dr. Lorimer, Secretary, dated* 13*th September* 1852.

* * * Assistant Surgeon Balfour's Hindustani translation of Dr. Conquest's Midwifery, is a work which is highly creditable to him as a Medical Officer and a Hindustani scholar.

(Signed) A. LORIMER, *Secretary Medical Board.*

FORT ST GEORGE, 13*th September* 1852.

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The objects and aim of the above publication will be gathered from its preface.

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*Proceedings of the Geographical Society, Bombay.*

"It was remarked on Dr. Balfour's Barometric sections, which gave rise to these observations,—the Bombay Government having requested the opinion of the Society as to their merits, —that they furnished a very valuable contribution to Physical Geography for which the Meteorologist and Geologist must feel most grateful. The Society were not in a position to test their accuracy, but from the fame of Dr. Balfour, there could be no doubt that every precaution had been taken to render them correct."—Proceedings Bombay Geographical Society, of 21st, as published in *Bombay Times,* 27th, August 1856.

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*Revenue Board, Fort St. George, Revenue Consultation No.* 54. *of 2nd June* 1857.

* * The paper compiled by Dr. Balfour will be a useful record for reference in the Office of the Board and the several Maritime Collectors. * * The arrangement adopted by Dr. Balfour is clear and precise. * * *

*From the Madras Athenæum.*

An unpretending publication has just been issued from the Scotch Mission Press, containing in a small compass, much information of interest to all whose pursuits require them to know in what the commercial wealth of this country consists. Styled "The Commercial Products of the Madras Presidency, as shown by its Exports and Imports, their quantities and values, for the four years 1852-53 to 1855-56 inclusive" it gives in detail every article of Export and Import forming the trade of the whole Madras Presidency. The value, of the total exports for that period, we observe, stated at Rs. 14,32,93,799 and that of the Imports at Rs. 11,35,20,461.

* * * These are some of the thoughts which have occurred to us from a hasty glance at these Commercial Tables, which we received yesterday; we will refer to them again at leisure, as the matter they contain is of great general importance. * * We consider they supply a general want which we ourselves have often felt.—*Madras Athenæum, March* 3, 1857.

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